DOCUMENT RESUME

ED 313 209 RC 017 353

AUTHOR	Wolanyk, Betty
TITLE	New York Agriculture in the Classroom. Grade 6.
INSTITUTION	New York Farm Bureau, Inc., Albany.; New York State Dept. of Agriculture and Markets, Albany.; New York State Education Dept., Albany.; State Univ. of New York, Ithaca. Coll. of Agriculture and Life Sciences at Cornell Univ.
PUB DATE	87
NOTE	178p.; Poster will not reproduce.
AVAILABLE FROM	Cornell University, Dept. of Education, 24 Roberts Hall, Ithaca, NY 14853 ($54.00 postpaid).
PUB TYPE	Guides - Classroom Use - Materials (For Learner) (051) -- Reference Materials - Bibliographies (131)
EDRS PRICE	MF01/PC08 Plus Postage.
DESCRIPTORS	Agricultural Machinery; Agricultural Production; *Agriculture; Class Activities; Educational Resources; Elementary School Science; *Farm Occupations; *Food; Grade 6; Intermediate Grades; Language Arts; *Livestock; Mathematics Materials; Rural Education; Science Activities; Social Studies
IDENTIFIERS	Family Farms; New York; *Plants (Botany)

ABSTRACT

These classroom exercises have been designed to maximize teacher time, while creating an awareness of our food and fiber system among New York sixth graders. The materials are color-coded, falling into four categories: language arts, mathematics, science, and social studies. Each exercise includes background information, concepts, and objectives for the teacher. The language arts series encourages students to: create and illustrate brief poems about nature; study agricultural terminology; identify and create advertising slogans; and read "The Life of a Pig," a narrative about pigs being raised for commercial purposes. The mathematics section teaches students to work with whole numbers and fractions, using word problems about agricultural production. The science unit includes instructions on helping students learn about the life cycles of plants by making a terrarium or growing a new houseplant from a leaf section. Other material helps students learn about growing corn, the food chain, and paper wasps. Materials in the social studies section help students learn about making paper, and about life on different kinds of farms. Additional resources include two Soil Conservation Society cartoon booklets about agriculture and land use, a wall poster illustrating beef byproducts, and a U.S. Department of Agriculture bibliography of 328 educational resources about agriculture. (TES)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

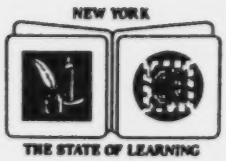
☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Elizabeth Wolanyk

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."



The New York Agriculture in the Classroom program is a partnership effort of the Cornell University College of Agriculture and Life Sciences, the State Education Department, New York Farm Bureau, and New York State Department of Agriculture and Markets. Funding to print and distribute these materials is provided by the New York State Legislature.

NEW YORK AGRICULTURE IN THE CLASSROOM

GRADE 6

by Betty Wolanyk

DEDICATION: To the memory of Patricia M. Brown, for her dedication to education and agriculture. Her contribution in developing the New York Agricultural Awareness curriculum forms the core of this project. We did it Pat!

Thanks to the following for their contributions:

American Society of Agricultural Engineers
Arizona Cowbelles
Bruce Brown
Calvin M. Brown
Scott DeCook
Iowa Pork Producers Assoc.
Maria Jasper
Carolyn Klass
Long Island Farm Bureau
NY Cattlewomen's Assoc.
NY Cattlemen's Assoc.
New York State Department of Agriculture and Markets
United States Department of Agriculture
Eugene VanOpdorp

typesetting: Janet St. Pierre

editing: Donna Wanner

artwork: Ellen Alexander
Patty Harrington Keagle
Linda Wheelin

project directors:

Daryle E. Foster, Ph.D.
Director, Instructional Materials Service
Department of Education
Cornell University
Ithaca, NY 14853

Bill Umscheid
Program Specialist
4-H Youth Development
Cornell Cooperative Extension
Cornell University
Ithaca, NY 14853

The program is administered by Cornell Cooperative Extension through the College of Agriculture and Life Sciences, Department of Education and the 4-H Youth Development program. Funding for distribution is provided by the New York State Legislature..

New York Agriculture in the Classroom

New York Farm Bureau, Inc.
New York State College of Agriculture and Life Sciences
New York State Department of Agriculture and Markets
New York State Education Department

Cornell University
Department of Education
24 Roberts Hall
Ithaca, New York 14853-5901
(607) 255-8122

November 1, 1987

Dear Educator:

These materials have been designed to maximize teacher time, address the concepts in the syllabus for each subject area and create an awareness of our food and fiber system. A conscious effort has been made to develop materials that were active in nature. The old adage: "Tell me, I'll forget; show me, I may remember; but, involve me, and I'll understand" has been our philosophy in developing these materials.

As you no doubt have already noticed, the materials are color coded. All teacher materials and answer keys are color-coded as follows:

pink.....	Language Arts
yellow.....	Mathematics
green.....	Science
blue.....	Social Studies

Student materials are white to eliminate problems in copying.

In the top, right-hand corner of each page is the major concept covered by that activity. Other concepts are indicated on the Teacher Material pages. The Langugage Arts materials also indicate which syllabus (of the five) was used. At the time this work was done, some of the syllabi were under revision. If this was the case, either the old syllabus or the draft of the new one was used. Adjustments will have to be made after the revised syllabus is made available.

It is crucial for you to understand that these materials are not intended to add to the curriculum. They simply offer a way to meet the concepts in the syllabus.

Thank you. Good luck with your efforts. I hope that you find these materials useful and enjoyable.

Sincerely,

Betty Wolanyk

Betty Wolanyk
Extension Associate

ss

NEW YORK AGRICULTURE IN THE CLASSROOM

ADVISORY COMMITTEE

Michael J. Bragman
(Chair, Agriculture Committee)
Legislative Office Building
Room 828
Albany, NY 12248

Martha Borgeson
(Asst. Commissioner for
Mktg. & Promotion)
Dept. of Agr. & Markets
1 Winners Circle
Albany, NY 12235

Calvin Brown
(Pork Producer)
Rosewood Farms
Whiskey Hill Road
Waterloo, NY 13165

William Deming
(Executive Director)
Rural Schools Program
293 Roberts Hall
Cornell University
Ithaca, NY 14853-5901

William Drake (Professor)
Agr. & Occupational Ed.
306A Roberts Hall
Department of Education
Cornell University
Ithaca, NY 14853-5901

Melvin Dye (Guidance Counselor)
Cuba Central School
Cuba, NY 14727

George Good (Professor)
Flor. & Ornamental Hort.
Cooperative Extension
Cornell University
Ithaca, NY 14853

Edward Heslop
New York Farm Bureau
Route 9W
P.O. Box 100
Glenmont, NY 12077

John Higham (Associate)
Bur. of Science Education
NYS Dept. of Education
302 Education Building
Washington Avenue
Albany, NY 12234

Margaret J. Hill
(Director of Public Relations)
Agway, Inc.
P.O. Box 4933
Syracuse, NY 13225

John Mann
(Coop. Extension Agent)
Farm, Home & 4-H Center
99 N. Broad Street
Norwich, NY 13815

Daniel Moskwa (Associate)
Bur. of Trade, Tech. & Agr.
NYS Education Department
99 Washington Avenue
Albany, NY 12234

Edwin Slusarczyk
(President & Gen. Mgr.)
Ag Radio Network, Inc.
Box 781
Utica, NY 13503

Rebecca DeSmith
(Elementary Teacher)
Phelps-Clifton Springs Sch. Dist.
Clifton Springs Elementary School
Clifton Springs, NY 14432

Bert Spaeth
(Vo-Ag Teacher)
Letchworth Central School
Gainesville, NY 14066

PILOT TEACHERS

New York Agriculture in the Classroom would like to recognize and thank the following teachers for piloting these materials:

Andrew Doyle
Penn Yan Jr. High School
Penn Yan

Karen Dyke
Chenango Bridge Elementary School
Chenango Valley

Cathy Fitzgerald
Hillcrest Elementary School
Chenango Valley

Judy Fleischman
H. W. Smith Elementary School
Syracuse

Tony Gangemi
H. W. Smith Elementary School
Syracuse

David Karweck
Penn Yan Jr. High School
Penn Yan

Marian Kellermeyer
Penn Yan Jr. High School
Penn Yan

Dorothy Lane
Chenango Bridge Elementary School
Chenango Valley

Rita McCain
H. W. Smith Elementary School
Syracuse

Mary Moreland
H. W. Smith Elementary School
Syracuse

Mary O'Neil
Elementary School #5
Oceanside

Donna Owens-Willsey
H. W. Smith Elementary Sch.
Syracuse

Vince Sgambati
H. W. Smith Elementary Sch.
Syracuse

Donna Shappee
Clifton Springs Elem Sch.
Clifton Springs

David Smith
Penn Yan Jr. High School
Penn Yan

Richard Stewart
Penn Jan Jr. High School
Penn Yan

Janet St. Pierre
Ithaca City School District
Ithaca

Rennie Timm
Shoreham-Wading River M.S.
Shoreham

James Verstringhe
Penn Yan Jr. High School
Penn Yan

Virginia Westerhalt
Southside Elementary School
Buffalo

TABLE OF CONTENTS

Pages

LANGUAGE ARTS

"Drawing Word Pictures"
Composition - to express self ..... 1 - 4

Vocabulary Activities - Teacher Materials 5

Multiple Meanings
Reading - vocabulary ..... 6 - 7

Homophone
Reading - vocabulary ..... 8 - 13

Homographs
Reading - vocabulary ..... 14 - 15

"Advertisements"
Composition - to persuade ..... 16 - 19

"The Life of a Pig"
Reading - comprehension ..... 20 - 31

MATHEMATICS

Teacher Materials ..... 32 - 34

"Dairy Farm" - Word problems
multiplication ..... 35 - 36

"Maple Syrup" - Word problems
subtraction, multiplication ..... 37 - 38

"Beef" - Word Problems
fractions ..... 39 - 40

"Farm Equipment" - Word problems
addition, subtraction, division, multiplication..... 41 - 44

Teacher Materials..... 45 - 47

"Steer" - Word problems
multiplication of decimals..... 48 - 49

"Pork Production" - Word Problems
multiplication of percentages..... 50 - 51

"Corn" - Word Problems
multiplication of percentages..... 52

"The U.S. Farmer" - Word Problems..... 53

"How Many Minutes?" - Word Problems
time..... 54 - 57

SCIENCE

"Growing a Green Thumb" - Teacher Materials
Life Science - IIA - 1.1, 1.2, 1.3, 1.4, 1.5..... 58 - 62

"Terrariums"
Ecosystems - IIIE - 1.1, 1.4, 2.11, 2.12, 1.21..... 63 - 65

"Make a Plant from a Leaf"
Life Science - III-A - 1.1, 1.32, 1.4..... 66 - 68

"Corn"
Life Science - IIIA - 1.31, 1.32, 1.33, 1.4..... 69 - 86

"Food Chains/Food Webs"
Ecosystems - IIIE - 1.2, 1.3, 1.4, 2.21, 2.22..... 87 -100

"The Paper Wasp"
Life Science - III A - 2.23, 2.4..... 101-109

SOCIAL STUDIES

"Making Paper"
technology, change..... 110-120

"Three Family Farms"
technology, interdependence, scarcity, environment, change, citizenship..... 121-145

"The Land/The Dracons" - Teacher Materials
technology, change, environment, scarcity, citizenship..... 146

RESOURCES

"The Land"
"The Dracons"
Poster: "Besides the Beef"
U.S.D.A. Catalog
"New York Agricultural Statistics"
A.S.A.E. Catalog - "Looking Back"

TEACHER MATERIALS

CONCEPT: Composition - to express self
Reading - comprehension

OBJECTIVES:
1. The students will use the cinquain as the form for the expression of an appreciation of nature.
2. The students will illustrate their cinquain.

BACKGROUND: An appreciation of the natural world is important to our self-fulfillment as well as in making decisions regarding the management of our resources.

Developing the skills of keen observation and sensory awareness are well integrated with feelings of appreciation and wonder in this lesson on cinquain.

This lesson would coordinate well with the science lesson about wildlife.

ACTIVITIES:
1. Read "Drawing Word Pictures." Allow students an opportunity to talk about scenes or experiences in nature which have been especially meaningful to them.

a. Read the cinquain, allowing time to develop a sense of the scenes represented in the cinquain.

b. If possible, go outdoors to an area where the students can observe and enjoy nature. This can be done in conjunction with the science lesson on wildlife.

c. Allow a quiet time for the students to close their eyes, relax, and visualize a scene from nature. Encourage vivid

visualization of details.

d. If students have trouble visualizing a nature scene, have them close their eyes while you "guide" their visualization of a walk through the park or through the woods.

e. Encourage the students to pay attention to the way they feel as they are experiencing nature, either directly or in their imaginations.

2. Have the students write their own cinquain, drawing upon their sensory experiences and their feelings.

3. The finished cinquain may be illustrated and displayed on the bulletin board.

Composition
- to express self

DRAWING WORD PICTURES

When we experience nature, we often have special feelings that are hard to express. Poetry is one way to draw a word picture of special feelings.

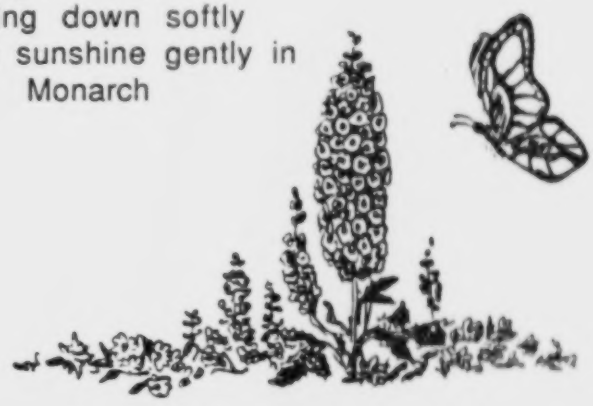
A cinquain is a poem with five lines. The first line has one word. This word is the same as the title or the subject. The second line has two words which describe the subject. The third line has three words. The third line contains the action words. The fourth line uses four words which describe feelings. The fifth and last line has one word which is a substitute expression for the title or subject.

Line:	Number of words:	The words express:
1	1 word	title or subject
2	2 words	description
3	3 words	action
4	4 words	feelings
5	5 words	substitute for title or subject

For example:

The Monarch Butterfly

Butterfly
bright, flutter,
lighting down softly
bringing sunshine gently in
Monarch



Take a walk outside - in a park or in the woods. Look at the beauty of nature. Do you see any birds, squirrels, or other small animals? Are there big, strong trees, or small, delicate plants? Flowers? Do you see clouds drifting across the sky? How does the air feel on your skin? Is there a slight breeze? Is the sun warm on your face? Does the air smell fresh and clean? Does the air carry the sweetness of flowers or the smell of the earth after a rain? What colors do you see? Is it the fresh green of young plants in spring, the golds and reds of autumn, or a white blanket of snow?

If you can't actually walk outdoors, you can close your eyes and imagine the sights, sounds, and smells of nature. Imagine all of the details of one of your favorite places and remember how it makes you feel.

Think of something special to put into your own special word picture. Write a cinquain to express yourself. When you are done, illustrate it.

TEACHER MATERIALS

CONCEPT: Reading - vocabulary
Language - grammar

OBJECTIVE: The students will become familiar with agricultural terminology, homographs and homophones, and multiple meanings.

BACKGROUND: Throughout most of human history the total population has been responsible for food and fiber production. Today, less than 3% of our population is on farms in the United States. Never before have so many been fed by so few. As a result, terms that were a common part of the language are now not understood by a majority of the population. This exercise is to familiarize students with those terms and their meanings.

ACTIVITIES:

1. Have the students complete the worksheets on multiple meanings, homophones, and homographs.

2. As the students complete the worksheet, have them write sentences using all of the words. This will insure that they understand the words.

3. Have the students indicate whether the words are nouns, verbs, adverbs, or adjectives.

4. Add the agricultural words to your spelling lists.

5. Play a word game with the students on other homographs, homophones, or multiple meaning words.

Vocabulary

Name_____ Date_____

Directions: Many words in our language have multiple meanings. On the left are words commonly used in agriculture. Their definitions are given. Give another meaning for these words.

bulb- the fleshy root of a tulip (noun) _____

duck-a bird with large webbed feet (noun) _____

plant- to place in the ground (verb) _____

rose- New York State flower (noun) _____

steer- neutered bull calf (noun) _____

Name *ANSWER KEY* Date _____

Directions: Many words in our language have multiple meanings. On the left are words commonly used in agriculture. Their definitions are given. Give another meaning for these words.

bulb- the fleshy root of a tulip (noun)

a light bulb

duck-a bird with large webbed feet (noun)

to avoid

plant- to place in the ground (verb)

a factory

rose- New York State flower (noun)

past tense of to arise

steer- neutered bull calf (noun)

to maneuver

Name_____Date _____

HOMOPHONES

DIRECTIONS: Homophones are words that sound the same, are spelled differently, and have different meanings. On the left are words used in agriculture with their definitions. Give a homophone for each word and its definition.

	Homophone	Definition
bear- large, shaggy mammal (noun)	_____-	_____
boar- male hog (noun)	_____-	_____
cereal- a breakfast food (noun)	_____-	_____
ewe- female sheep (noun)	_____-	_____
genes- tiny unit of heredity (noun)	_____-	_____

Name *ANSWER KEY* Date _____

HOMOPHONES

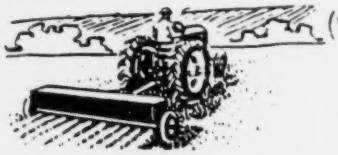
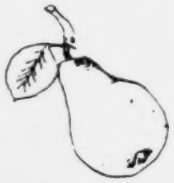
DIRECTIONS: Homophones are words that sound the same, are spelled differently, and have different meanings. On the left are words used in agriculture with their definitions. Give a homophone for each word and its definition.

		Homophone	Definition
bear-	large, shaggy mammal (noun)	bare	without cover, lack of usual clothing
boar-	male hog (noun)	bore	to make a hole, or one that causes boredom
cereal-	a breakfast food (noun)	serial	in series, a work appearing in intervals
ewe-	female sheep (noun)	you	the one being addressed
		yew	a type of shrub
genes-	tiny unit of heredity (noun)	jeans	a cotton article of pants (denim)

Name_____Date _____

HOMOPHONES

DIRECTIONS: Homophones are words that sound the same, are spelled differently, and have different meaning. On the left are words used in agriculture with their definitions. Give a homophone for each word and its definition.

	Homophone	Definition
beet- a red root eaten as a vegetable (noun)	_____	_____
deer- small, graceful animal with antlers (noun)	_____	_____
sow- to plant seed (verb) 	_____	_____
steak- tender cut of beef (noun)	_____	_____
pear- juicy yellow fruit (noun) 	_____	_____

Name *ANSWER KEY* Date _____

HOMOPHONES

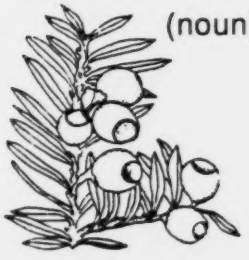
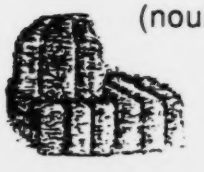
DIRECTIONS: Homophones are words that sound the same, are spelled differently, and have different meaning. On the left are words used in agriculture with their definitions. Give a homophone for each word and its definition.

		Homophone	Definition
beet-	a red root eaten as a vegetable (noun)	beat	a rhythm
deer-	small, graceful animal with antlers (noun)	dear	a term of affection
sow-	to plant seed (verb)	sew	to join together pieces of cloth with thread
steak-	tender cut of beef (noun)	stake	a pointed piece of wood driven into the ground
pear-	juicy yellow fruit (noun)	pair	two of an item

Name_____Date _____

HOMOPHONES

DIRECTIONS: Homophones are words that sound the same, are spelled differently, and have different meaning. On the left are words used in agriculture with their definitions. Give a homophone for each word and its definition.

	Homophone	Definition
whey- the watery part of milk which separates from the curds in cheesemaking	_____	_____
wether- neutered male sheep (noun)	_____	_____
yew- a type of shrub (noun) 	_____	_____
hay- dried grasses (noun) 	_____	_____

Name ***ANSWER KEY*** Date _____

HOMOPHONES

DIRECTIONS: Homophones are words that sound the same, are spelled differently, and have different meaning. On the left are words used in agriculture with their definitions. Give a homophone for each word and its definition.

	Homophone	Definition
whey- the watery part of milk which separates from the curds in cheesemaking	way	a course of travel, a means to travel
wether- neutered male sheep (noun)	weather	atmospheric conditions
yew- a type of shrub (noun)	you	the person being addressed
	ewe	a female sheep
hay- dried grasses (noun)	hey	an exclamation used to call attention

Name_____Date_____

HOMOGRAPHS

DIRECTIONS: Homographs are words that are spelled the same but sound differently and have different meanings.

	Homograph	Definition
lead-to show the way (verb)	_____	_____
sow-an adult female swine (noun)	_____	_____
read-to understand written material (verb)	_____	_____
contract-to come down with a sickness (verb)	_____	_____
close-to shut or to end (verb)	_____	_____

Name ANSWER KEY Date _____

HOMOGRAPHS

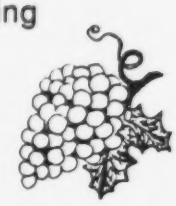
DIRECTIONS: Homographs are words that are spelled the same but sound differently and have different meanings.

	Homograph	Definition
lead-to show the way (verb)	lead	a heavy metallic element
sow-an adult female swine (noun)	sow	to plant seed
read-to understand written material (verb)	read	having understood written material (past tense of to read)
contract-to come down with a sickness (verb)	contract	a legal agreement
close-to shut or to	close	near to

TEACHER MATERIALS

CONCEPTS:

Composition	-	to persuade
Reading	-	vocabulary in advertising
	-	interpreting
	-	conclusions
Language	-	grammar



OBJECTIVE: The student will identify advertising slogans and create one of their own for a New York agricultural product.

BACKGROUND: Advertising today, as in the past, relies on slogans and jingles to catch the public's attention. It is important to evaluate what the slogan or jingle says instead of absorbing the concept verbatim as we do so often.

ACTIVITIES:

1. Have the students watch television, listen to the radio or read a magazine and list as many slogans and jingles as they can on the first worksheet, as a homework assignment.

2. Discuss the message in each. Answer these questions:

   (a) What product does the slogan or jingle describe?

   (b) What information does the ad provide? What are the product's good points that the advertisement emphasizes? i.e. healthy, nutritious, natural etc.?

(c) What influences do the words chosen have? i.e. does the ad make one want to eat? What words influence one to do so?

(d) How does the music influence the listener?

3. Give the students a list of slogans or use those identified by the students and play a game to identify what product they represent.

4. Have the students make a bulletin board display of slogans cut from magazines and newspapers. Categorize each as the questions in #2 indicate.

   Example:

Slogan / Product / Jingle	Information/	Influencing / Words	Affect of Music
or			

5. Have the students select a New York agricultural commodity and write their own slogan or jingle. (See commodity listing in resource section - white sheet).

6. Have the students illustrate their own jingle or slogan.

7. Have the students develop one slogan into a commercial and videotape it.

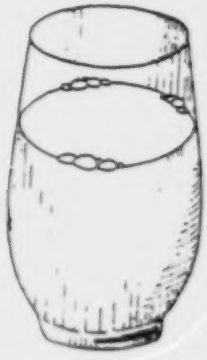
Composition

-to persuade

Name_____Date _____

Advertising uses many slogans. Some food slogans we hear are:

"Have more milk, 'cause milk's got more!"
".. the incredible edible egg!"
"New York table grapes... the best of the bunch!"
"Pork: lean on it"
"Milk - America's favorite health kick"



List as many food slogans as you can:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Composition
- to persuade

Name_____Date _____

Write your own slogan or jingle from the list of New York products:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Illustrate your finished product.

TEACHER MATERIALS

CONCEPTS:

Reading	-	comprehension
	-	vocabulary
Social Studies	-	technology
Health	-	nutrition
Life Science	-	III A - 2. 1, 2.3
	-	III E - 1.2
		1.3, 2.22

OBJECTIVES: The student will read and comprehend the story, "Life of a Pig."

BACKGROUND: Technology has changed the face of agriculture. Farms are now specialized; raising livestock has become a science. From birth to market is a very short 5 1/2 months. When ready for market, a hog will weigh 210 pounds. Technology has also affected how we utilize that animal once it is slaughtered. For many reasons, swine by-products are almost as important as the meat produced by the animal. For open-heart surgery patients, diabetics or victims of severe burns, the by-products are more important. Swine are very intelligent, clean animals, and are bred today to be lean animals, contrary to the popular "fat as a pig" image.

ACTIVITIES:

1. Have the students read "The Life of a Pig."

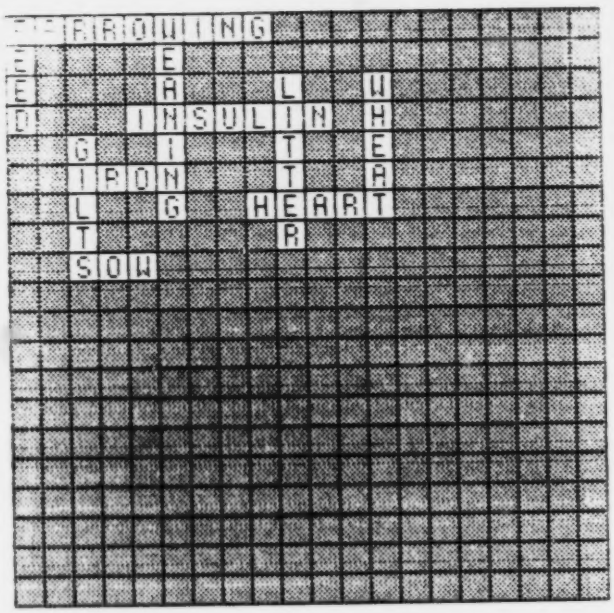
2. Have the students complete the vocabulary definitions with the use of a dictionary.

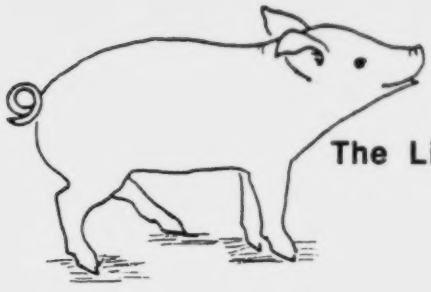
3. Have the students complete the crossword puzzle to determine comprehension.

4. Discuss how this system of swine production differs from the traditional view of a fat pig in a pig pen.

5. Use the Social Studies activity "Three Family Farms".

Answers: LIFE OF A PIG



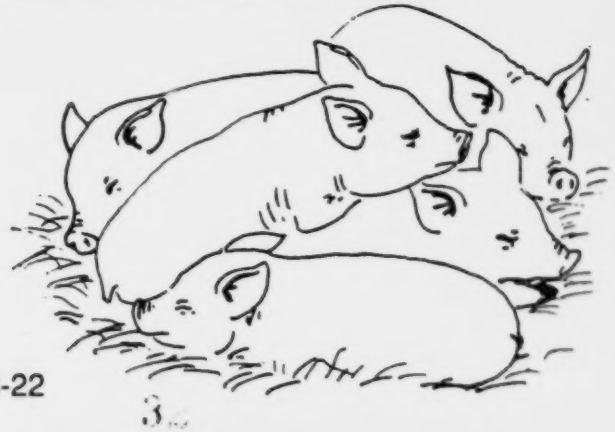


The Life of a Pig

as told by Bruce Brown

I was just born, a piglet. Birth is known as farrowing. My mom is next to me in a pen called a farrowing crate. This crate stops her from lying on any of us. I have ten brothers and sisters. Together, we are known as a litter. A litter of this size is normal for a sow like mom. Sow (rhymes with cow) is the proper name for my mom.

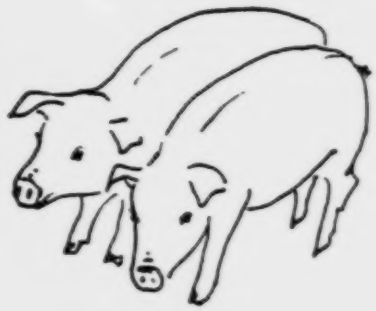
Right now I am lying next to my mom, the sow, under a heat lamp, nursing. A small piglet, like me, needs to be kept very warm. We have a heat lamp over us and the floor under us is heated. The farrowing crate gives us plenty of room to walk around. Sometime, before tomorrow, the people who work here will cut off my dried up umbilical cord, notch my ears (so they know who I am), and give me a shot of iron. Then, they will clip my teeth so I won't hurt my mother when I nurse. I also have my tail clipped so that my brothers and sisters won't chew on it.



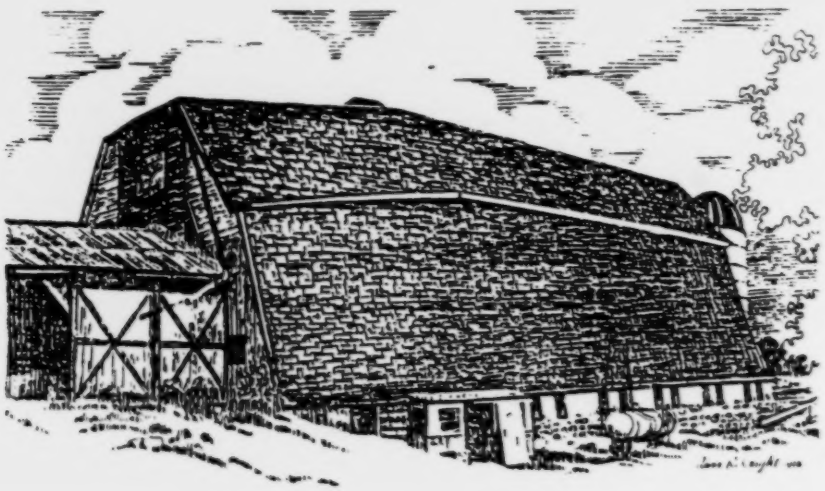
For the next two weeks I will nurse from my mother, sleep and play. After that, the people give us grain to eat. The grain is put in a small feeder known as a creep feeder. This is full of high protein feed and we learn to eat solid food.

When we are two weeks old, the male pigs are castrated. Then we are known as barrows. Castrating the males makes the meat taste better when we become pork. The females are called gilts. At four weeks old, we are taken to another pen and separated from mom. We call this weaning. (Sooner or later all mammals must be weaned from their mothers).

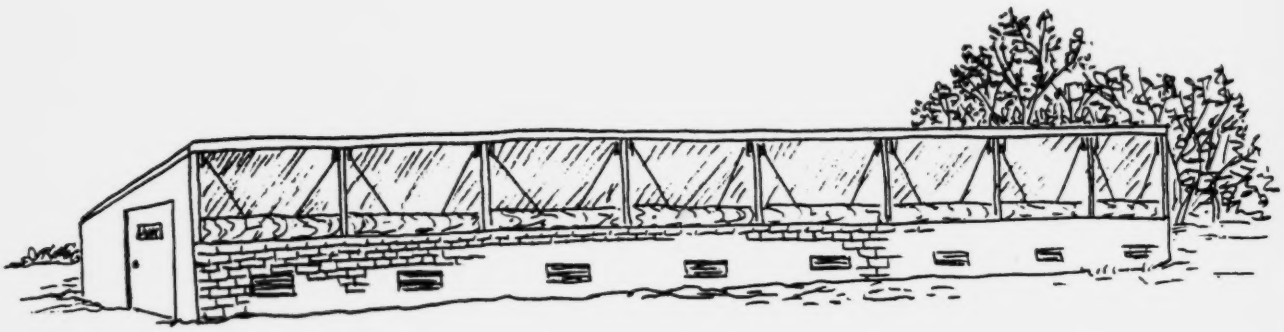
I weigh about 15 pounds now. When I was first born, I weighed 3 pounds. I grow very fast on my mother's milk. After weaning, the sows are sent to the breeding barn.



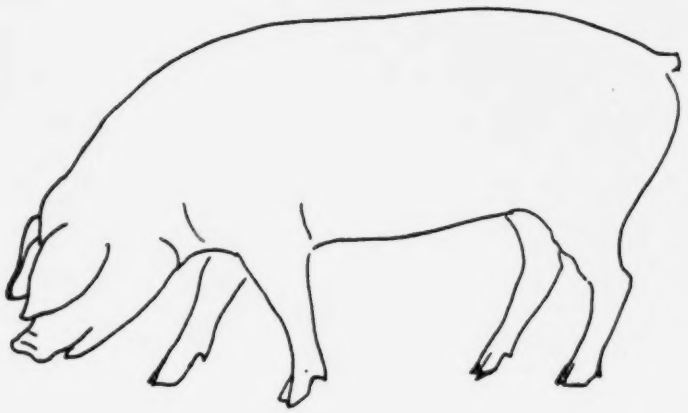
They are bred by the boar so they can have another litter. It will take three months, three weeks and three days from the time the sow is bred until she farrows again. The people joke and say, "... and three o'clock in the morning."



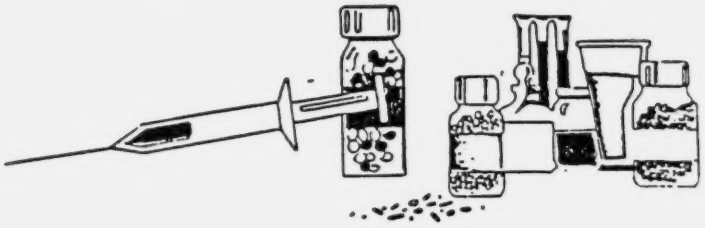
Now we are put into the hot nursery which is kept at 80° F (ten degrees lower than the farrowing room). We are still on high protein feed. Two weeks later, we move into a cooler room, the cold nursery, at 65° F. I weigh 25 lbs and I am six weeks old now. Some of my brothers and sisters are sold to farms. The best of us stay here. Next stop - the finishing barn. This will be my last home on the farm. I keep growing all the time. I weighed in at 45 pounds.



In the finishing barn, I am fed a feed that is a mixture of 50% corn, 25% barley and 25% wheat. A soybean meal supplement is added to this. The supplement has fish meal, soybean meal, alfalfa meal, vitamins, and minerals. There are no antibiotics or other medicines in my feed. When I am 5 $1/2$ months old and 210 pounds, it is time for me to go to market.



The best gilts in my pen are kept on the farm and used for breeding. The rest of us take a 6 hour truck ride to Pennsylvania. We are sold to a meat packing plant. There we are slaughtered and processed into the meats you like to eat. My skin is processed in leather and gelatin or used to treat severe burn victims. My organs are used to make medicines like insulin for diabetics. My heart valves are removed and used in open heart surgery in humans, to replace their damaged valves. I could also be used for fertilizer, glue, plastics, cosmetics or hundreds of other products.



Name_____Date_____

Vocabulary

Directions: Define the words using a dictionary. After each word is defined, use it in a sentence.

1. farrowing- definition:_____

_____

sentence:_____

_____

2. litter- definition:_____

_____

sentence:_____

_____

3. sow- definition:_____

_____

sentence:_____

_____

4. pork- definition:_____

_____

sentence:_____

_____

5. mammals- definition:_____

_____

sentence:_____

_____

6. weaning- definition:_____

_____

sentence:_____

_____

7. nursery- definition:_____

_____

sentence:_____

_____

8. supplement- definition:_____

_____

sentence:_____

_____

9. antibiotics- definition:_____

_____

sentence:_____

_____

10. process- definition:_____

_____

sentence:_____

_____

11. slaughter- definition:_____

_____

sentence:_____

_____

12. severe- definition:_____

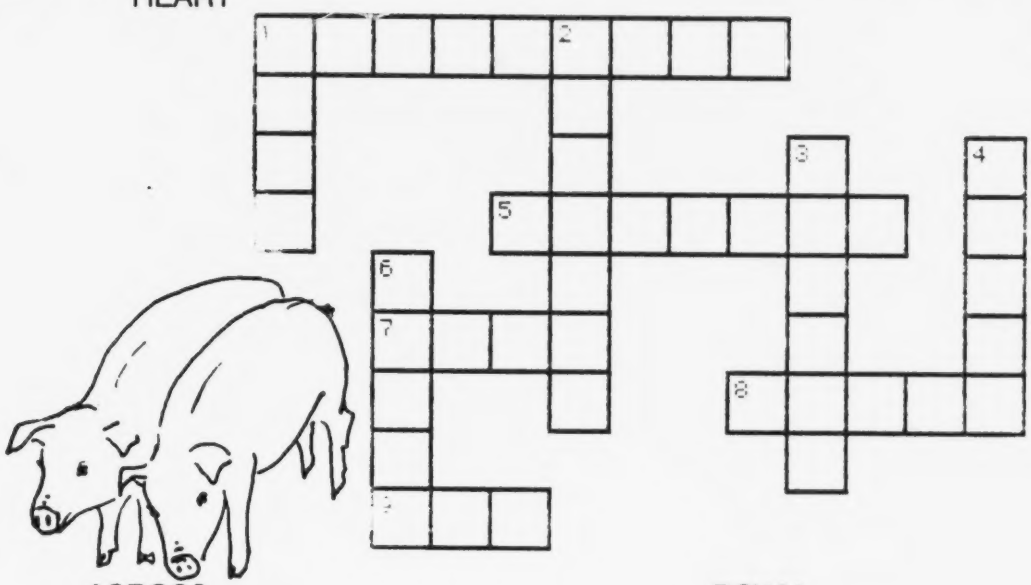
_____

Name _____ Date _____

LIFE OF A PIG

DIRECTIONS: Use this word list to complete the crossword puzzle:

FARROWING	INSULIN	SOW
FEED	IRON	WEANING
GILTS	LITTER	WHEAT
HEART		



ACROSS

1. the process of a sow giving birth.
5. a hormone that is needed by diabetics
7. _____ shots are given to newborn pigs.
8. Human _____ valves are replaced by swine valves
9. mother hog

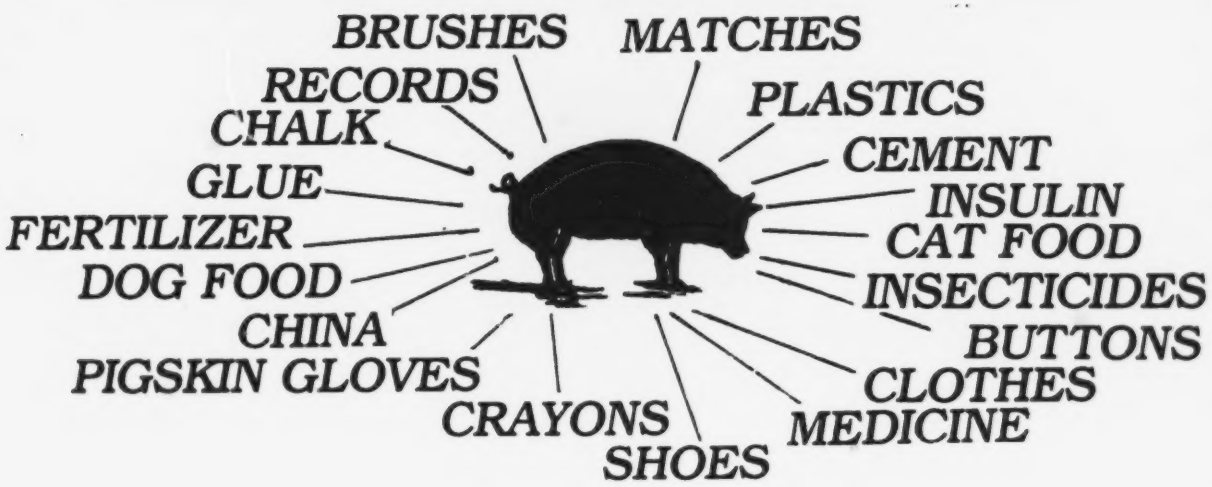
DOWN

1. _____ is found in the creep.
2. separating piglets from the sow at four weeks of age
3. group of piglets born together
4. Corn, _____, and barley are mixed together into feed.
6. young female swine

Name _____ Date _____

Unscramble the following:

Pork by-products



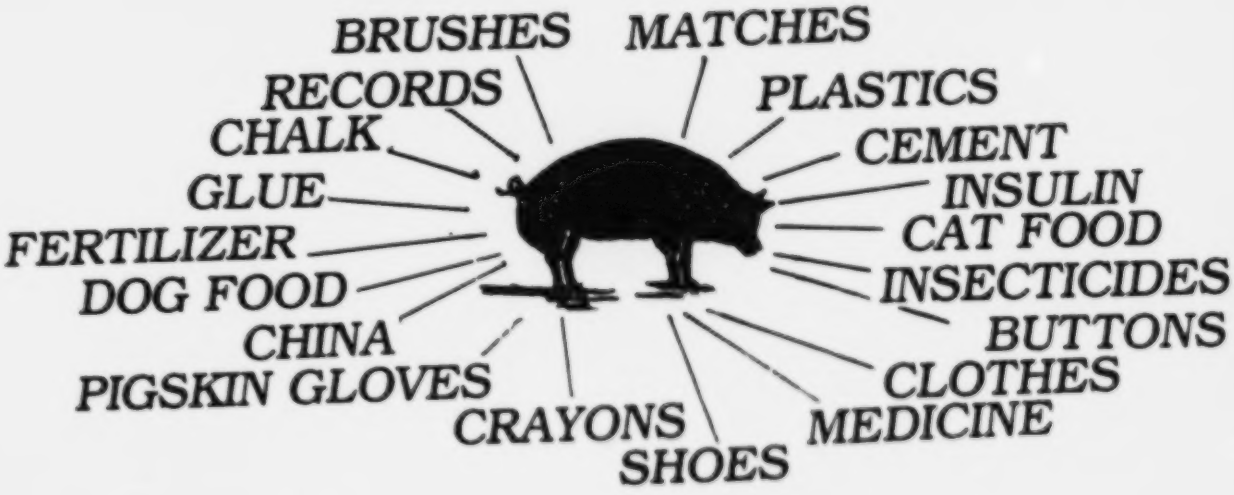
1. elgu _____
2. kiignsp vlseog _____
3. gipsnki tigclnoh _____
4. tsbtonu _____
5. tzelfiirer _____
6. yosracn _____
7. lkach _____
8. cdrores _____
9. shrubes _____
10. tescamh _____
11. lptiassc _____
12. mneetc _____
13. nniilus _____
14. atc oodf _____
15. odg dofo _____
16. desticiniesc _____
17. nhcia _____
18. midicene _____

*Reprinted with permission from Iowa Pork Producers Association

Name ANSWER KEY Date _____

Unscramble the following:

Pork by-products



1. elgu glue
2. kiignsp vlseog pigskin gloves
3. gipsnki tigclnoh pigskin clothing
4. tsbtonu buttons
5. tzelfiirer fertilizer
6. yosracn crayons
7. lkach chalk
8. cdrores records
9. shrubes brushes
10. tescamh matches
11. lptiassc plastics
12. mneetc cement
13. nniilus insulin
14. atc oodf cat food
15. odg dofo dog food
16. desticiniesc insecticides
17. nhcia china
18. midicene medicine

*Reprinted with permission from Iowa Pork Producers Association

TEACHER MATERIALS

CONCEPTS:

Mathematics
- Whole numbers
  - addition
  - subtraction
  - multiplication
  - division
  - word problems
- Fractions
  - adding
  - multiplying
  - lowest common denominator
  - word problems

Social Studies - technology
Reading - for comprehension
Science - life science

OBJECTIVE:

The students will perform the functions listed above and gain an appreciation for the extent of agriculture in our economy as well as its diversity and the amount of investment in agriculture today.

BACKGROUND:

1. The dairy farm is the mainstay of New York agriculture. The dairy farmer is actually paid in dollars for every 100 pounds of milk he or she produces. In other words, the price quoted is $11.00 per hundred weight (cwt) rather than 11 cents per pound. Today's dairy farmers are actually not earning 1/10 of their gross receipts. Many are having difficulty breaking even.

2. "Maple Syrup" deals with New York's maple industry as if all syrup produced here were sold retail. Such is not the case. Much of our syrup is sold in bulk to neighboring states. Lower quality syrup is used for blending, flavorings,

candies, cremes, in imitiation syrup mixtures, etc. Therefore, there is a discrepancy between the answer to question #5 and the information given in the introduction. See if the students pick this up themselves. If not, point it out and explain.

3. The beef steer is a neutered bull calf. The calf is castrated before it reaches puberty. If you have difficulty explaining this concept, relate it to spaying a family pet. Not all beef animals are steers. Many are young females as well. Neutering the bulls prevents them from breeding the females as they are raised, and controls aggressive behavior. Bulls are very aggressive and unpredictable; therefore, dangerous. Not all of the anatomy of the steer is discussed--the fractions are too small to be manipulated at 6th grade.

4. "Farm Equipment" details the cost to purchase equipment on today's farms. These are up-to-date prices for <u>some</u> of the equipment needed on one of New York's dairy farms.

ACTIVITIES:

1. Have the students perform the mathematical calculations as indicated.

2. Discuss the information presented as interest in the subject warrants.

ANSWERS

Worksheet #1 - The Dairy Farm

1. 1,500,000 pounds
2. 1,875 gallons
3. $1,650
4. $165,000
5. $16,500

Worksheet #2 - Maple Syrup

1. $37,800,000
2. 288,000 gallons
3. 43,296,000 gallons of sap
4. 27,144,000 gallons of sap
5. $15,312,000

Worksheet #3 - The Beef Steer

1. rump - 100 lbs.
   flanks - 100 lbs
   round - 166 2/3 lbs.
   shoulder - 200 lbs.
   rib - 66 2/3 lbs.
   middle - 166 2/3 lbs.
   legs & hooves - 66 2/3 lbs.
2. 1/15
3. 66 2/3 lbs.

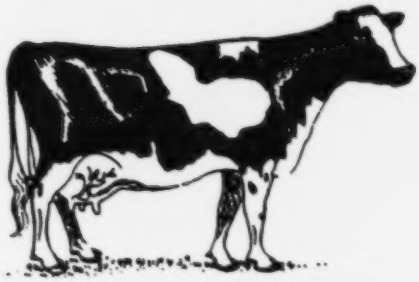
Worksheet #4 - Farm Equipment

1. $45,000 more
2. $81,000
3. a) $100,000 b) $181,000
4. $90,500
5. $65,250

Word Problems
- multiplication

Name_____ Date_____

1. Mr. Johnson owns a dairy farm. He milks 100 cows a day. Each cow produces an average of 15,000 lbs. of milk per year. How many pounds of milk does Mr. Johnson get from his herd of 100 cows in one year?



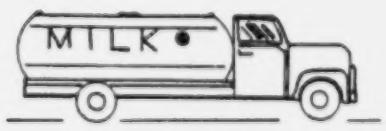
_____

2. A gallon of milk weighs 8 lbs. How many gallons of milk does an average cow produce in a year?

_____

3. The average price paid to the farmer for his milk is $ .11 per pound of milk. How much would the farmer get paid for the milk of one cow for a year?

_____



4. How much would Mr. Johnson receive for the milk from his herd of 100 cows for a year?

_____

5. Mr. Johnson has many expenses to pay from the income he receives. The cost of one tractor is almost 1/3 of the amount he receives for the milk in a year. Mr. Johnson gets to keep only 1/10 of his income from milk sales after paying all his expenses. How much does Mr. Johnson get to keep in one year?

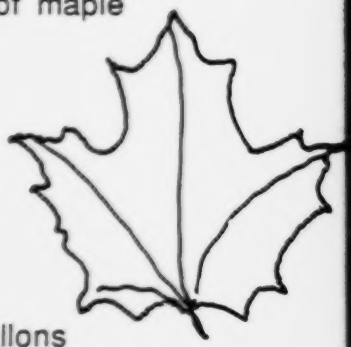
_____

Name_____ Date_____

MAPLE SYRUP

Directions: Answer the following questions by adding, subtracting or multiplying. Show all your work.

1. Maple syrup production is a $5,400,000 business in New York State. New York ranks second only to the state of Vermont. For every dollar earned by the maple syrup producer, seven (7) dollars are generated in that community to supply the producer with materials, energy, transportation, packaging and services. How many dollars are generated in New York from the production of maple syrup?



2. The maple syrup "crop" was down to 696,000 gallons because of a very short season this year. Maple syrup last year was 984,000 gallons. How many more gallons were produced in New York last year?

3. Maple syrup is produced by boiling down the sap of the maple tree. The amount of sap needed to produce one gallon of syrup depends on how sweet the sap is. Last year it took 44 gallons of sap to produce one gallon of syrup. If 984,000 gallons of syrup were produced, how many gallons of sap did it take?

4. This year it took 39 gallons of sap to make one gallon of syrup. If the crop was 696,000 gallons of syrup, how many gallons of sap were needed to be boiled?

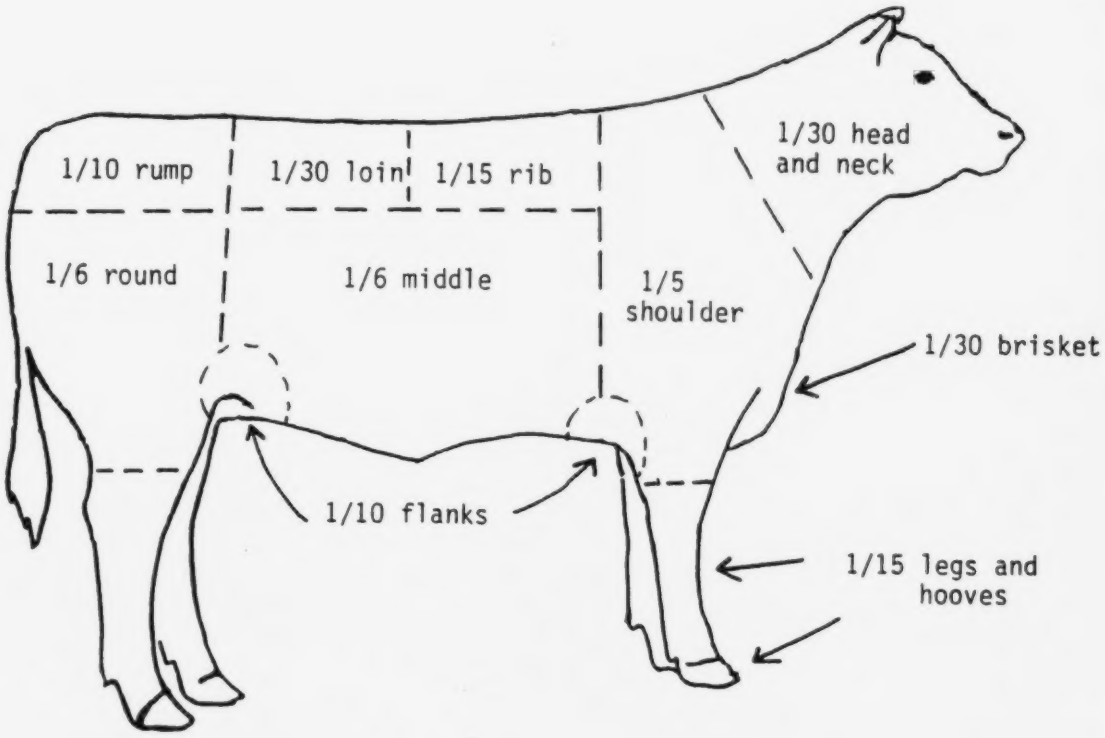
5. This year, a gallon of real maple syrup sold for $22 a gallon. How much was the crop worth if 696,000 gallons were produced?

WORD PROBLEMS
-adding & multiplying fractions
-lowest common denominator

Name_____Date_____

Directions: Find out how much each part of this steer weighs by adding and multiplying the fractions times the weight of the steer. Fill in the blanks next to the names of each part. Show your work in the space provided.

1. This beef steer weighs 1,000 pounds. Each part of its body has a fraction on it to tell how much of the body it is.



pounds of:

_____rump _____flanks

_____round _____shoulder

_____rib _____middle

_____ legs and hooves

2. Add together the loin and brisket. What fraction of the steer is this?

_____

3. How many pounds would the loin and brisket weigh together?

_____ lbs.

WORD PROBLEMS
- addition, subtraction, division, multiplication

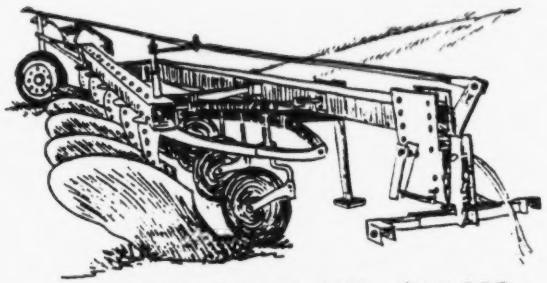
Name_____ Date_____

FARM EQUIPMENT

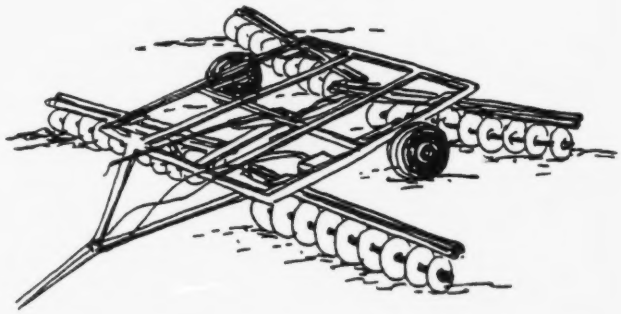
1. Today, farm equipment is a large investment for a farmer. Frank and Janet Hubley want to start farming. They drive to the equipment dealers and learn how much tractors will cost them. A small diesel tractor (40-50 horsepower) will cost them $18,000. But this isn't big enough for their plans. They need a tractor twice that big. They learn that a tractor the size they will need (95 horsepower diesel) will cost them $63,000. How much more will it cost for the large tractor they need?

2. Janet talks to Frank and tells him that in the spring and fall they will need both tractors. Frank agrees with Janet. How much will these two tractors cost together?

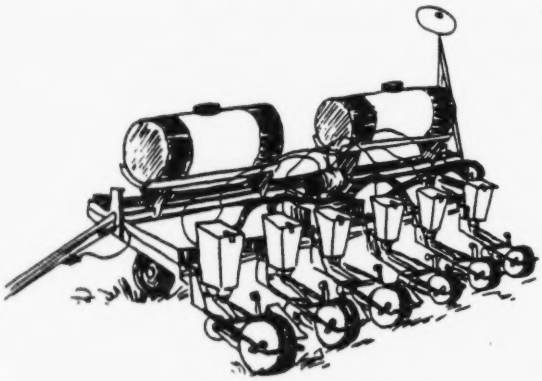
3. In addition to the tractor, Frank and Janet have decided that they will need many more pieces of equipment. Some they will buy and others they will rent. They decide that they need to buy these pieces of equipment at the price listed.



A 5 BOTTOM PLOW- $10,000

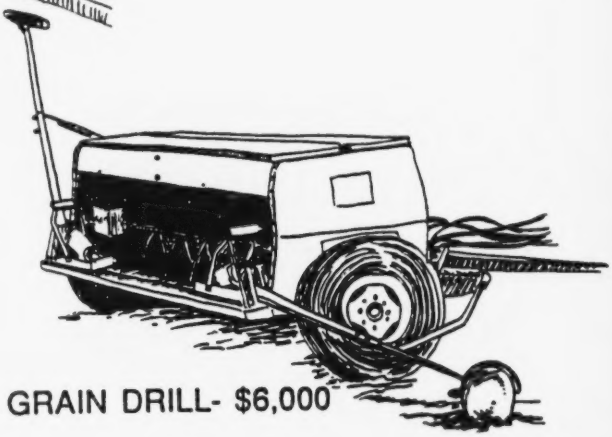


AN 18 FOOT DISC- $10,000



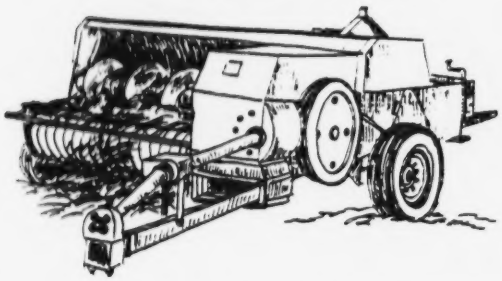
A 6 ROW CORN PLANTER- $15,000

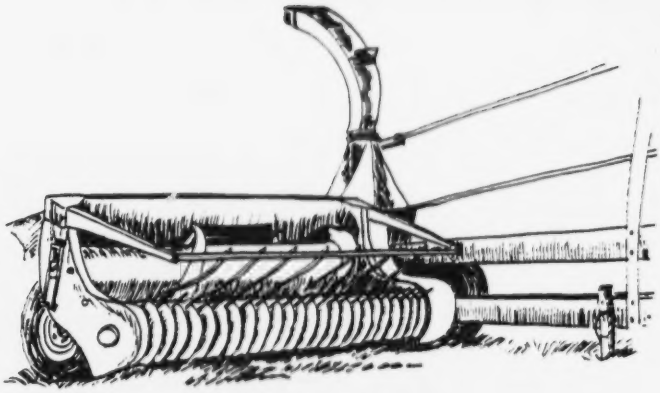
A 9 FOOT CUT HAYBINE- $10,000



A GRAIN DRILL- $6,000

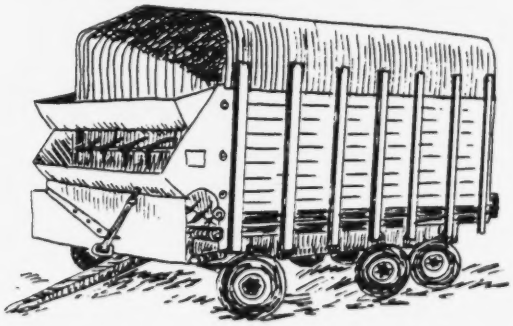
A HAY BALER- $12,000



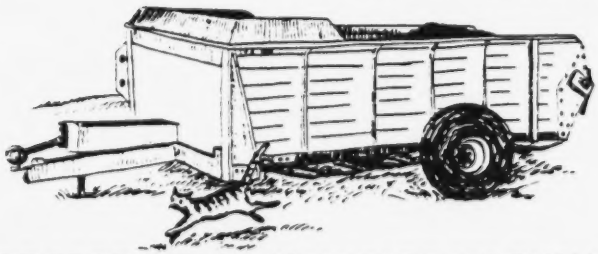


A FORAGE HARVESTER
FOR
CORN OR HAY - $20,000

A SELF-UNLOADING FORAGE
WAGON- $8,000



A FORAGE BLOWER TO
LOAD THE SILO- $3,000



AND A MANURE SPREADER WHICH HOLDS 200 BUSHELS - $6,000

3a. How much will all of this equipment cost?

3b. How much is the total if Frank and Janet buy the two tractors?

a) _____equipment b) _____total with two tractors

4. If Frank and Janet buy used equipment, it will cost half of the cost of the same equipment. How much would it cost Frank and Janet to buy equipment if they buy used equipment?

5. Frank and Janet plan to rent the land, home, buildings, and the rest of the equipment they will need for the first five years they are in business, but they have decided to buy the cows they need to produce milk. If they buy 40 milking cows for $1,100 each and 25 heifers which will produce calves and begin to milk within the next 3 months for $850 each, how much will they need to pay for cattle?

TEACHER MATERIALS

CONCEPTS:

Mathematics
- percentages
- subtracting, multiplying
- word problems
- proportions (time)
- data gathering

Social Studies - technology
Science - life science
Reading - for comprehension

OBJECTIVE: The student will complete the exercises given and gain an appreciation for U.S. agriculture.

BACKGROUND: Agriculture is a diverse and complex industry. The three worksheets on beef, swine and corn illustrate the uses of those products. The exercise "The U.S. Farmers" illustrates the fact that, although few in number, U.S. farmers have a significant impact on the world's food supply.

"How Many Minutes?" is intended to develop student appreciation for how little we pay for food in the U.S. in comparison with the rest of the world.

ACTIVITIES: Have the students complete:

1. "The Steer"
2. "Pork Production"
3. "Corn"
4. "The U.S. Farmer"
5. "How Many Minutes"

ANSWERS

Worksheet #5 - The Steer

1. $550
2. 650 lbs.
3. 350 lbs.
4. 25%
5. $4.80

Worksheet #6 - Pork Production

1. 41.8 lbs.
2. 30.8 lbs.
3. 6.6 lbs.
4. 12.10 lbs.
5. 15.4 lbs.
6. 6.6 lbs.
7. 48.5%
8. 47%

Worksheet #7 - Corn

1. 34.2 lbs.
2. 10.6 lbs.
3. 2.2 lbs.
4. 9.0 lbs.
5. 1278 products

Worksheet #8 - World Food Production

36% soybeans
44% grapefruit
54% corn
69% sorghum
75% oranges
76% poultry
77% peas
77% beef
82% cotton
83% wheat
86% eggs
87% pork

Worksheet #9 - How Many Minutes

1. 25 minutes

2. a. 49 minutes
   b. 27 minutes
   c. 1075 minutes
   d. 32 minutes
   e. 47 minutes
   f. 121 minutes

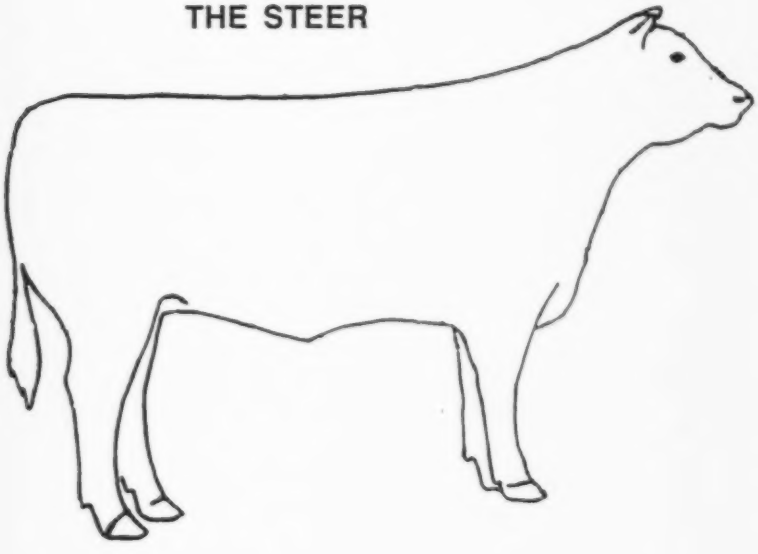
3. a. 3/4 hour
   b. 1/2 hour
   c. 18 hours
   d. 1/2 hour
   e. 3/4 hour
   f. 2 hours

4. The United States

WORD PROBLEMS
- **multiplying**
- **decimals**

Name_____Date_____

THE STEER



PART I

This beef steer weighs 1,000 pounds when he is ready to be marketed. A steer is a neutered bull. The farmer will receive 55 cents for every pound that this animal weighs. Beef animals are marketed, as are many other agricultural commodities, on a hundred weight basis.

1. How much money will the farmer receive for this 1,000 pound steer?

PART II

The cuts of meat from this steer will weigh 65% of the 1,000 pounds. Some of that meat will contain small amounts of bone. The other 35% will be by-product, which will be used for various purposes such as the production of hormones, glue, leather, pharmaceuticals, cosmetics and many other products.

1. How many pounds of beef will be produced from this 1,000 pound carcass?

2. How many pounds of by-products will be produced from this carcass?

3. During the pioneer era of California, cattle sold for $24.00 per head. The meat value was only $6.00 -- the rest went to by-products. What percent of the total was the value of the meat?

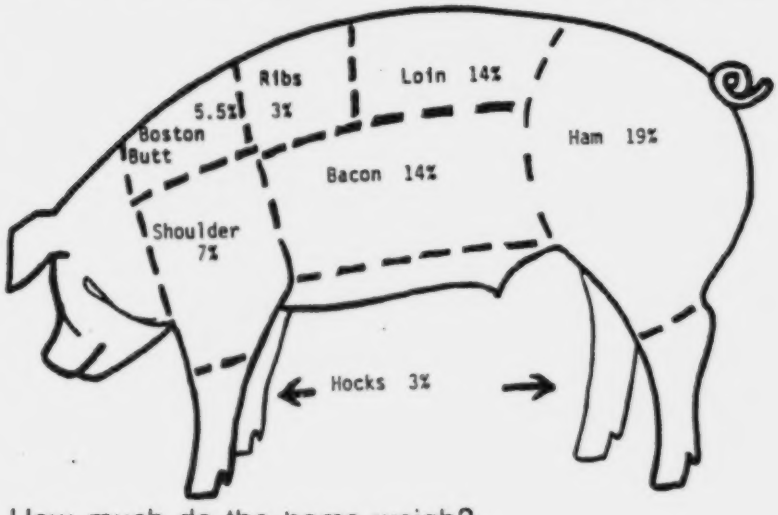
4. The butcher would sell the hide, organ meats and by-products for 20% of what was paid for the steer. How much could those be sold for?

WORD PROBLEMS
- **multiplying**
- **percentages**

Name_____Date_____

PORK PRODUCTION

When this hog is sent to market, it weighs 220 pounds. By using the percentages labeled, answer these questions:



1. How much do the hams weigh?

2. How much does the loin weigh?

3. How much do the ribs weigh?

4. How much does the Boston Butt weigh?

5. How much do the shoulders weigh?

6. How much do the hocks weigh?

7. If the total how is 100%, what % is left over?

8. From the total hog, 104 pounds are edible meat. What percentage of the total hog is edible meat?

WORD PROBLEMS
- multiplication,
- percentages

Name_____Date_____

The United States grows more corn than any other nation in the world. When a food processor buys a bushel of corn, he gets 61% starch, 19% feed, 4% oil and 16% water. A bushel of corn weighs 56 pounds. Calculate the number of pounds and round off to the nearest tenth of a pound.

1. How much starch is the processor getting?_____

2. How much feed is the processor getting?_____

3. How much oil is the processor getting?_____

4. How much water is the processor getting?_____

5. 75% of all grocery store food items contain corn in some form. There are 1704 different food products. How many of these contain corn in some form?

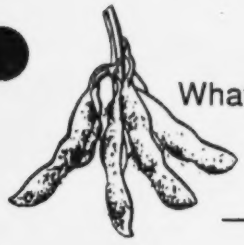
_____

PERCENTAGES

Name _____ Date _____

With less than three-tenths of one percent (.3%) of the world's farmers and farm workers, the United States produces:

64% of the world's SOYBEANS	23% of the world's GREEN PEAS
56% of the world's GRAPEFRUIT	23% of the world's BEEF
46% of the world's CORN	18% of the world's COTTON
31% of the world's SORGHUM	17% of the world's WHEAT
25% of the world's ORANGES	14% of the world's EGGS
24% of the world's POULTRY	13% of the world's PORK



What percent is produced by the rest of the world?

_____% soybeans	_____% green peas
_____% grapefruit	_____% beef
_____% corn	_____% cotton
_____% sorghum	_____% wheat
_____% oranges	_____% eggs
_____% poultry	_____% pork

Name _____ Date _____

HOW MANY MINUTES ?

The chart below shows how long it takes workers in different countries to earn the money to buy the same amount of food.

Country	1 lb. Pork (minutes)	1 lb. Bread (minutes)	1 Dozen Eggs (minutes)
Brazil	31	4	14
Britain	14	2	11
China	500	200	375
Italy	20	2	10
Mexico	33	3	11
Soviet Union	40	8	73
United States	17	3	5

ANSWER THESE QUESTIONS BY ADDING THE MINUTES IN THE CHART:

1. This United States family ate 1/2 lb of bacon (pork), 1/2 dozen eggs, and 1/3 of a loaf of bread for breakfast. It took one of the parents about 12 minutes to earn the money to pay for it. How many minutes would it take to earn 1 pound of bacon (pork), 1 dozen eggs, and 1 pound of bread?

2. Now figure out how many minutes it would take to earn the same amount of food in the rest of the countries.

A BRAZIL

B BRITAIN

C. CHINA

D. ITALY

E. MEXICO

F. SOVIET UNION

3. How many hours does it take in each of these countries to earn enough money to pay for this food? (Round off the minutes to the nearest 15 minutes before dividing).

   For example, in the United States it would take 25 minutes to earn the food. THis would be rounded to 30 minutes. Then it would be 30 ÷ 60 or 1/2 hour.

A. BRAZIL

B. BRITAIN

C. CHINA
(China would be difficult. HINT: Instead of rounding, just add 5 minutes to the total and then divide.)

D. ITALY

E. MEXICO

F. SOVIET UNION

4. Which country's workers spend the least amount of time to earn one pound of pork, one pound of bread and one dozen eggs?

TEACHER MATERIALS

Instructions for the teacher:

"Growing a Green Thumb" is designed for those who know little or nothing about growing plants. If you fall into this category, read on; if not, simply use the plant-growing exercises for the students.

Introduction:

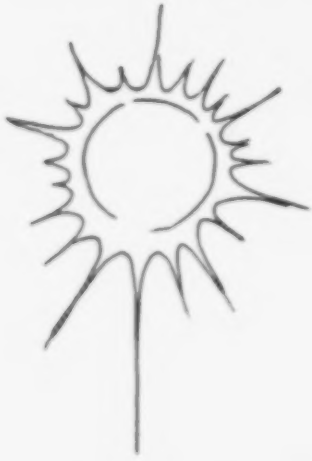
It would seem that some people have a green thumb and others kill every plant they have ever owned. The difference is not some wonderful personality trait, but rather knowledge. Instead of providing mountains of information on the care and feeding of each plant you could come in contact with in a lifetime, this offers a simple, common-sense approach to growing plants. It does not provide the exact care of individual plants, but gives general ideas that will help you understand the basic care of any 'type' of plant.

Some of the teachers piloting these materials suggested that "Grow a Green Thumb" was good information for their students. Therefore, we are printing it on white paper if you would like to use it as such. It was originally intended for teacher use.

GROWING A GREEN THUMB

Plants alone produce food. The rest of us simply convert plant and animal food into fuel for our own bodies. A plant takes energy from the sun, combines the nutrients and water from the soil and produces the carbohydrates and proteins that we think of as food and fiber. When growing plants, it is important to keep that in mind.

A plant needs sunlight, water, nutrients, adequate temperature and air. If deprived of any one of these, it will not be able to sustain itself. Whenever possible, use common sense in growing plants.



Light

All plants need sunlight. However, different plants have adapted to different amounts of light. That is why some plants make excellent houseplants, some plants can get sunburned and some require full light. A good rule of thumb is to consider where a plant originated and its growth pattern to estimate the amount of sun it needs. For example: a tropical tree which would have its top above the jungle floor will need diffused or low intensity sunlight. A plant that grows on a prairie, desert, or open meadow will need bright, direct sunlight.

It is also a good rule of thumb to realize that any sudden changes in the amount of sunlight a plant receives will have an impact on the plant.

Artificial light is better than none. The major problem with artificial light is that the light does not contain the full spectrum of wavelengths that most plants need. If only artificial light is available both incandescent

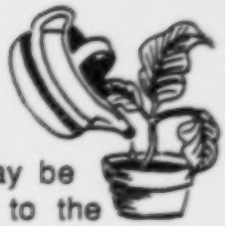
and fluorescent

light should be used. "Grow" lights can provide the full spectrum for plants.

Water and Air

All plants need water. Here again the amount of water a plant needs depends upon the adaptations a plant has made. A desert plant, having adapted to its environment, needs little water.

All plants need air, both above and below the ground. The one fact that people are not generally aware of is that a plant's roots need equal amounts of water and air. If the soil becomes water-logged, the plant will literally drown. Again, the amount of air needed will depend upon the adjustments a plant has made to its environment. Cattails can thrive in standing water while a cactus would rot. Most mistakes in caring for houseplants are made because people water incorrectly. By doing so, one alters the amount of air pockets in the soil.



Water plants consistently! Once or twice a week may be sufficient for tropical plants. If the soil feels cool to the touch, the soil is moist enough. If the plant wilts, you've waited too long and it will be damaged. Don't overwater, especially if you've let the plant dry out!

A plant produces more oxygen than it needs during photosynthesis. But, when a plant is in the dark (at night) it respires much as an animal would.

Temperature

The temperature which a plant needs to thrive varies with the plant. Again, think of where the plant originated. A tropical plant will not be able to withstand a freeze. The exact temperature for each plant can become complex. However, room temperature above 60°F is generally adequate for most houseplants. Germination of seeds usually requires at least a 70°F soil temperature.

Nutrients

Plants usually obtain nutrients through their roots from the soil (there are exceptions). The three major nutrients a plant needs are nitrogen, phosphorus and potassium, known by their chemical symbols N-P-K. When one purchases a 'plant food' or fertilizer, a ratio will be found on the package. This ratio tells what percent of those nutrients is in that container. A 10-10-10 ratio means that 10% of the material in the package is nitrogen, 10% is phosphorus and 10% is potassium. There may also be some "micro-nutrients", a carrier, surfactant, and other inert ingredients used to provide easy distribution of the nutrients. The fertilizer ratio is always given by N-P-K so a 15-5-10 would be 15%N, 5%P and 10%K. As a beginner, try to find an even ratio 10-10-10, 5-5-5, or 20-20-20 to fertilize

with. Plants do have varying nutritional requirements as do people, but that is a more advanced lesson.

Schedule feedings on a monthly basis, following the package requirements. Do not fertilize your plants in late autumn or winter. The plant isn't getting much light so it will not be growing as actively.

Begin monthly feedings in early spring (late March) as day length increases.

Selecting Plants

Common houseplants have been selected as houseplants because they can take some neglect, lower intensity light and lower humidity. If you are a beginner, start with common houseplants--not exotic, difficult-to-grow ferns. Good starter plants are philodendron, golden pothos, spider plants, swedish ivy, and sansevieria. Build your confidence and commitment to being a horticulturist with a plant that can adapt.

Outdoors in a garden the same is true. Tomatos, zucchini, zinnias, marigolds and beans are good starters. Work your way up to delicate herbs and hybrid roses.

Good luck! These tips should prove helpful. Just remember, plants are living things which require care!

Ecosystems - III E-1.1, 1.4, 2.11, 2.12, 2.21

TEACHER MATERIALS

CONCEPTS: Ecosystems - III E - 1.1, 1.4, 2.11, 2.12, 2.21

Life Science-III A -

1.1 plant health, growth and development are affected by environmental conditions

1.32 absorbed and stored energy is used for growth and development of a plant and production of its offspring

1.4 plants affect the environment

Physical Science - III D -4 - the water cycle

Social Systems - environment

OBJECTIVES:

1. The students will make and observe a terrarium.
2. The students will create a new plant from a leaf section.

BACKGROUND: A terrarium is an excellent teaching tool. Soil is limited to control plant growth. The water cycle can be viewed and the oxygen cycle can be explained. The leaf section experiment shows two plant principles. The first that plants reproduce in many ways, and the second is that some plants store food in their leaves. The plant used in this activity is an example of a plant with food and water stored in its leaves. This stored food allows the leaf section to live while the plant develops roots and a new plant.

Ecosystems III E
1.1, 1.4, 2.11,
2.12, 2.21

A TERRARIUM

MATERIALS:

1. A glass container
   - large brandy snifter
   - commercial terrarium
   - a large food service jar - 1 gallon (often the school cafeteria will save these for you if you ask)
2. potting soil
3. several small plants: one tree-like (small palm), one vine-like (philodendron), one bush-like (pepperomia)
4. activated charcoal - in pet supply section or with aquarium supplies
5. small pebbles for drainage

ACTIVITIES: Have the students:

1. Place pebbles 1/2" thick on the bottom of container.
2. Sprinkle 1/2 cup full of activated charcoal on top of this.
3. Add 1: of potting soil - keep this to a minimum.
4. Arrange plants as desired.
5. Press plants firmly into place.
6. Add limited potting soil to cover roots.
7. Add 1/2 cup of water.

8. Close the container/jar--use lid...for other containers use clear plastic wrap and a rubber band.

9. Place in an area with indirect sunlight (a non-southern window, if possible).

10. Observe -- if the terrarium has condensed water on the sides and top at all times, it has too much water; open cover and allow some to escape. The students should be able to observe changes throughout the day.

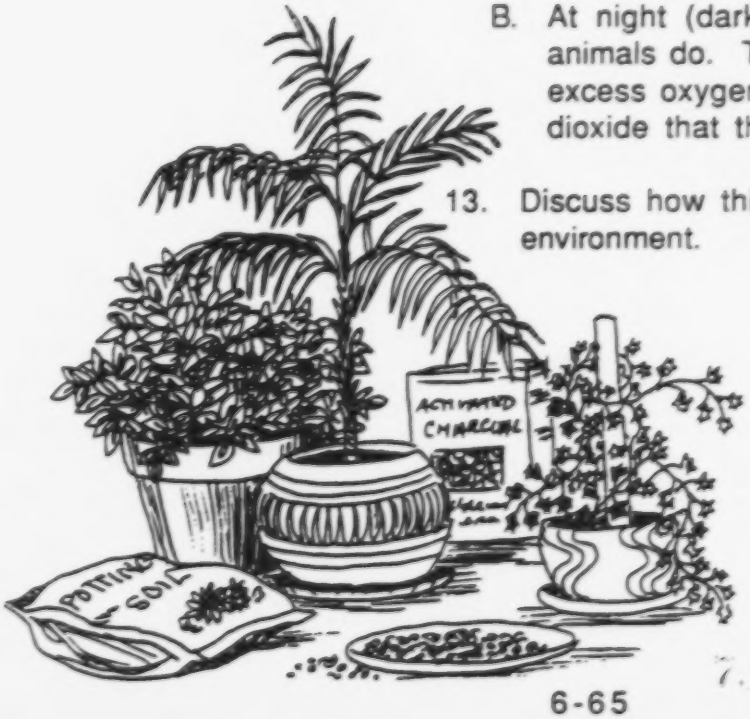
11. Discuss the water cycle. Highlight the energy input from the sun which is necessary for the cycle to continue.

12. How do the plants breathe?

    A. During the day (light) the plants produce more oxygen than they need through photosynthesis.

    B. At night (dark) the plants respire as animals do. They then use up the excess oxygen and produce the carbon dioxide that they need in the day.

13. Discuss how this impacts the environment.

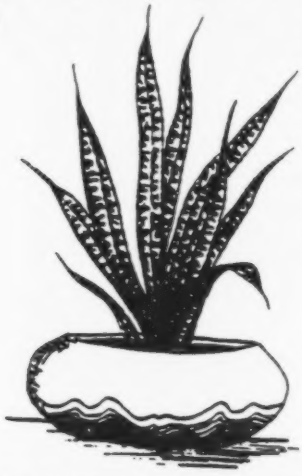


Life Science III A
1.1, 1.32, 1.4

MAKE A PLANT FROM A LEAF

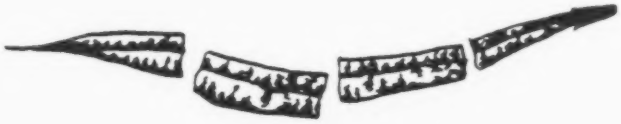
MATERIALS:

- potting soil
- pots or container of some sort (paper cups)
- water
- sansevieria (snake plant, mother-in-law tongue)



ACTIVITIES:

1. Cut a leaf into 3 or 4 sections with a sharp knife. If you want the students to do it themselves, scissors can be used, but it does damage the leaf. Each section should be 3-3 1/2 inches long. Keep track of which end



faces upward and which end faces downward. For best results, allow the cuttings to sit overnight in the air. This will allow them to callus over. The callus will prevent the leaf from rotting before it can grow roots.

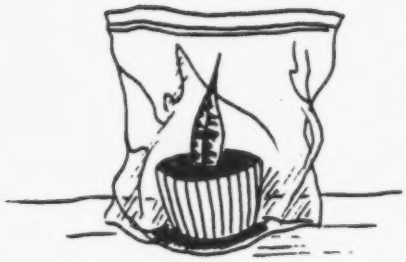
2. Fill the pots with potting soil.

3. Place the leaf section into the pot - make sure the "down" side is in the soil.

4. Press the soil around the leaf section (all sections can grow).

5. Water the pot.

6. Place into a makeshift greenhouse (plastic bag).



7. Watch it grow - it will take quite a while.

8. Discuss the role food storage plays in this activity. (The plant stores food and water in its leaves. This is why it can survive until its roots develop).

Plant Care

1. Keep the soil moist, but not soaked.

2. If possible, create a greenhouse-like environment, by covering the plants with plastic. This will keep the humidity high. A zip-lock type bag works well.

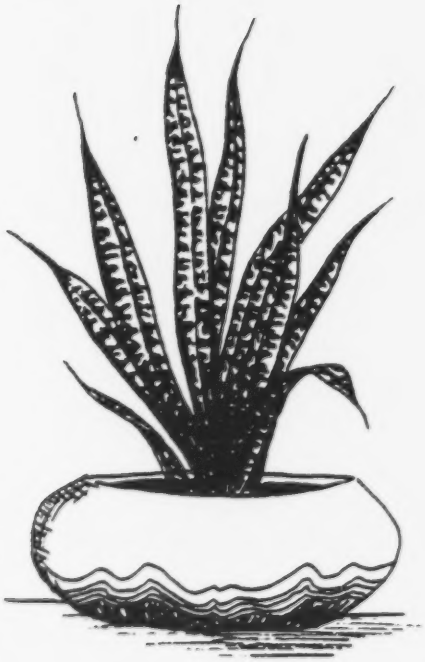
3. At this stage, indirect sunlight is best until the plants begin to grow. (The plant should be producing roots and not stressing itself by trying to produce food without water or nutrients.)

4. Don't expect all the cuttings to survive. It will take at least 6 weeks for new shoots to begin. Be patient!

5. Fertilize the plants once they begin to grow.

6. Move plants to the sunlight or send them home with the students.

7. The new plant will grow up from the bottom of the leaf section.



Life Science -
1.31, 1.32, 1.33, 1.4

TEACHER MATERIALS

CONCEPT: Life Science - 1.31, 1.32, 1.33, 1.4
Ecosystems - 2.21

OBJECTIVES: At the end of this unit, the student will be able to describe the structure and function of the plant. The student will be able to apply this knowledge of structure and function to the way they utilize or know corn in their life.

BACKGROUND: The structure and function of plants is an essential concept for understanding the workings of the world around us. Plants provide us with much more than food. Plants give us fiber, fuel, pleasure, oxygen, shade and protection. When we wish to beautify our environment, often the first step is to include plants. Many of the science concepts taught to students are applied in agriculture to produce food and fiber. This lesson is designed to demonstrate that the information in the science unit has direct application on the farm, in the greenhouse, at mealtime, and in each person's daily life.

ACTIVITIES:

1. Make copies of the lesson, including the pictorial, and have the students read the lesson "Corn."

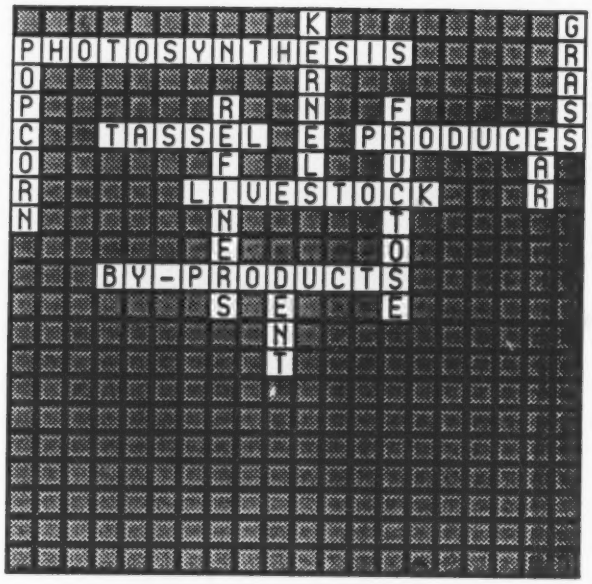
2. Have the students complete the worksheets.

3. Pop some popcorn and discuss why corn pops. (As the water in the seed expands into water vapor, the pressure inside the kernel causes it to explode. This is also a good physical science lesson.)

4. Have the students complete the crossword puzzle using information in the lesson and on the diagram.

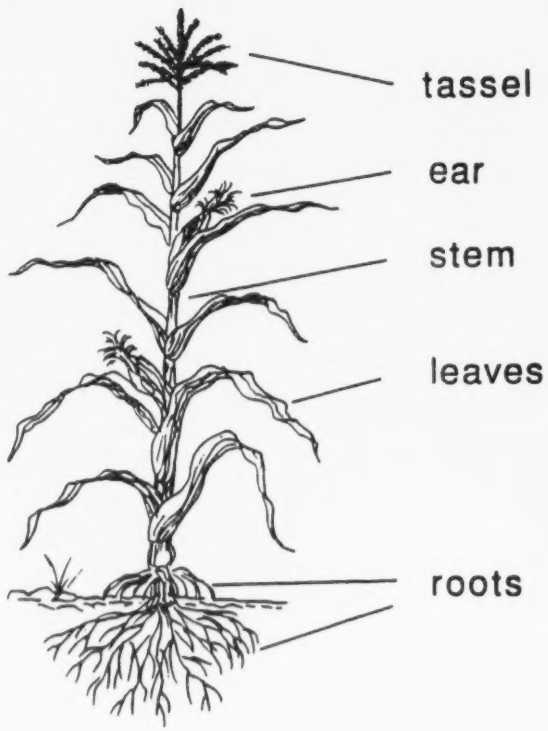
5. Make use of the quiz.

Answers: Corn



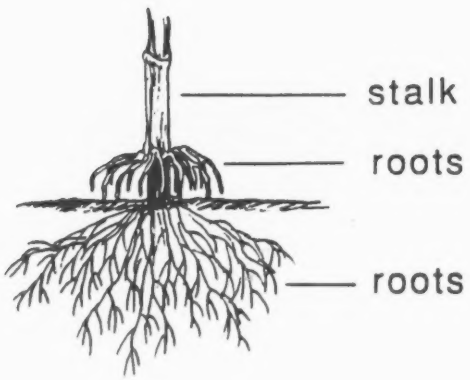
CORN

One of the major crops grown in the United States is corn. We produce more corn than any other country in the world. Corn has some properties that are different from other plants. It has leaves, roots, and flowers as most plants do. But those roots and flowers are a bit different.



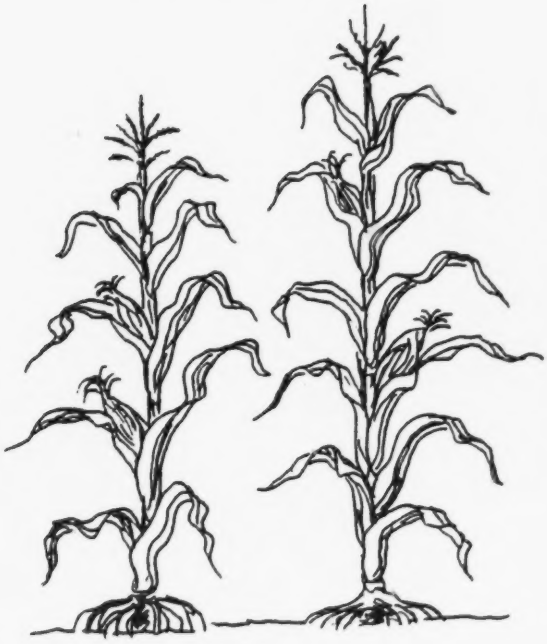
Roots

The roots of a plant take in water from the soil. As they take in water, roots also take in minerals from the soil that a plant needs. (Minerals are plant food.)



In addition, roots support the plant and take in air. If a corn field is flooded, the corn can actually drown.

The roots of a corn plant are different from most plants because along with the roots that are in the soil, a corn plant has roots above the soil to help hold up the plant. Many tropical plants have these roots. Corn was originally a tropical plant in South or Central America.

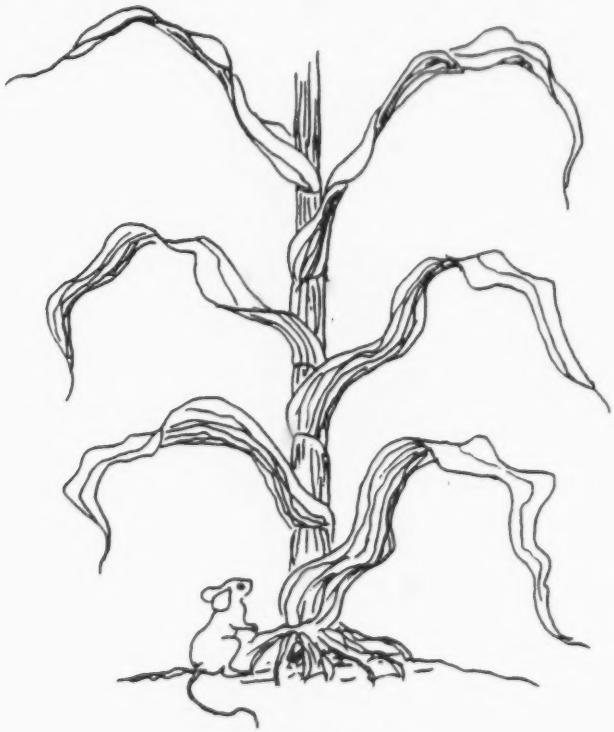


Stem

The stem of the corn plant holds the plant up and supports the leaves. The stem is called a stalk. It is important for the stalk to be strong so that it can live through rain, hail and high winds.

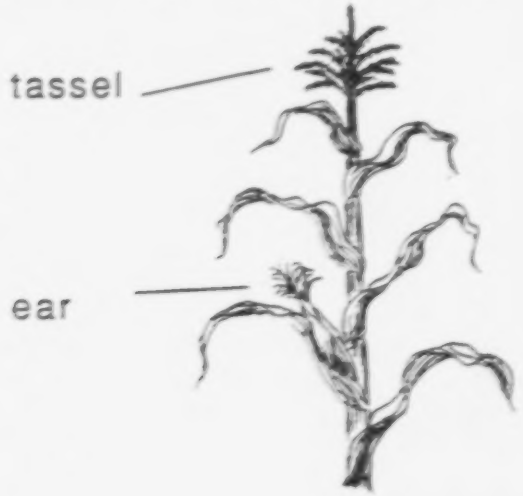
Leaves

The leaves of a corn plant are long and thin. They are like the leaves of grass on the lawn. Corn is a grass. The leaves are where photosynthesis takes place. Photosynthesis is the process by which plants make food from sunlight, water, and minerals.



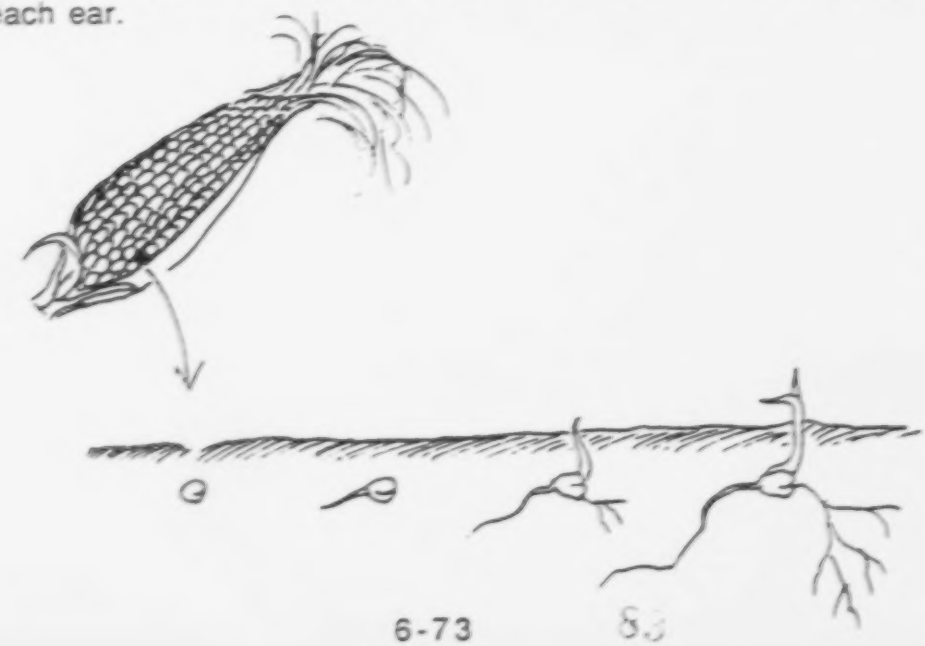
Flowers

The flower of a corn plant is also different. Instead of having one flower containing male and female parts, corn has separate flowers. The top of the plant, called the tassel, is the male flower. The ear in the middle of the plant is the female flower. When you eat sweet corn (corn on the cob), you are eating the female part of the corn plant.



Seed

The seed of the corn forms inside the female ear. Each kernel of corn is a seed. Every whole kernel can grow a new corn plant. Each corn plant usually has one ear of corn. Some plants will have two ears. An ear of corn has hundreds of kernels. In the 100 days a corn plant grows, it produces 500 kernels on each ear.



Popcorn, sweet corn, Indian corn and field corn are all different types of corn. They all grow the same way and have the same parts.

Corn is used for many things. Sweet corn and popcorn are eaten with very little or not processing. Most corn used today is dent corn. Dent corn (field corn) is also used as a feed for livestock. Farmers use the whole field corn plant, including the ear, to make silage for cattle.

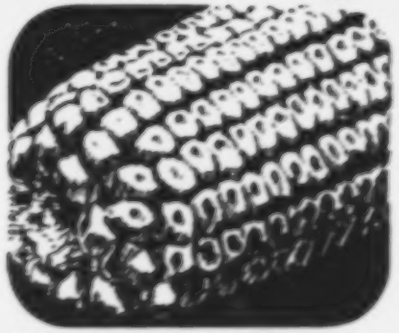
Corn refiners separate the corn grain into starch, hulls, germ, gluten and liquids. They process these parts into corn starch, corn syrup, dextrose, corn oil, feed and corn meals. From these products come hundreds of corn by-products.

Some corn by-products:

- Soap
- Rubber substitutes
- Paint
- Acids
- Adhesives
- Enzymes
- Dyes
- Wallpaper paste
- Crayons
- Flour mixes
- Dietetic foods
- Vinegar

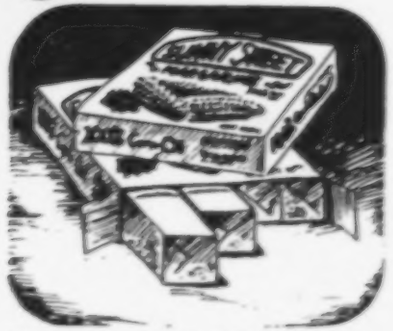
Every day Americans eat products that contain 3 pounds of corn and corn products such as fructose. Fructose is corn sugar.

To you this may be just a bushel of corn...



But look closer.

It's enough pure golden corn oil

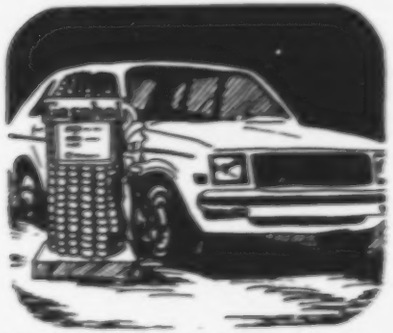


To make two pounds of Corn Oil Margarine.

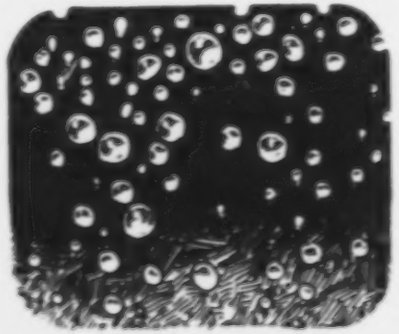
It's also enough protein meal to raise three chickens.

It has 14.5 pounds of protein feed for livestock and makes either...

Makes 33 lbs. of fructose, a corn sweetener 1½ times sweeter than ordinary table sugar, or...



From what's left, 2½ gallons of power alcohol for gasohol can be produced, and also...



It's 17 pounds of carbon dioxide which...

Can be used to accelerate the hydroponic growth of fresh vegetables. And...

So you see...we get both food and fuel from each bushel of corn.

NEBRASKA CORN DEVELOPMENT, UTILIZATION & MARKETING BOARD

Box 95107
Lincoln, Nebraska 68509

56

Name _____ Date _____

WORKSHEET

Label the parts of the corn plant.

1. _____
2. _____
3. _____
4. _____
5. _____

Name_____Date_____

WORKSHEET 2 - CORN

1. Corn has two kinds of roots. The type below the ground does three very important things.
   These are:

   a. _____

   b. _____

   c. _____

2. What do the type of roots that can be seen above ground do?

   _____

   _____

3. A plant's roots breathe. What can happen to corn if the field becomes flooded?

   _____

4. What is another name for corn's stem?

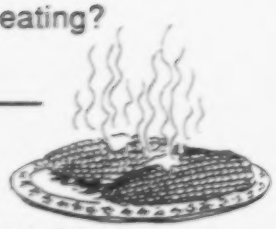
   _____

5. Why should the farmer make sure that the stalks on the corn are strong?

   _____

   _____

6. When you eat corn, what part of the plant are you eating?



_____

7. If an ear of corn has five hundred seeds, how many new plants could it possibly produce?

_____

8. What different types of corn are there?

_____

_____

_____

9. What do the corn's leaves do?_____

_____

_____

10. List 5 corn products.

1. _____ 4. _____

2. _____ 5. _____

3. _____

Name ANSWER KEY Date

1. Corn has two kinds of roots. The type below the ground does three very important things.
   These are:

   a. take in water

   b. take in minerals (plant food)

   c. breathe, support

2. What do the type of roots that can be seen above ground do?

   support

3. A plant's roots breathe. What can happen to corn if the field becomes flooded?

   it may drown

4. What is another name for corn's stem?

   stalk

5. Why should the farmer make sure that the stalks on the corn are strong?

   so it can live through hail and high winds

6. When you eat corn, what part of the plant are you eating?

the female flower

7. If an ear of corn has five hundred seeds, how many new plants could it possibly produce?

500

8. What different types of corn are there?

dent pop

flint (Indian)

sweet

9. What do the corn's leaves do? photosynthesis

10. List 5 corn products.

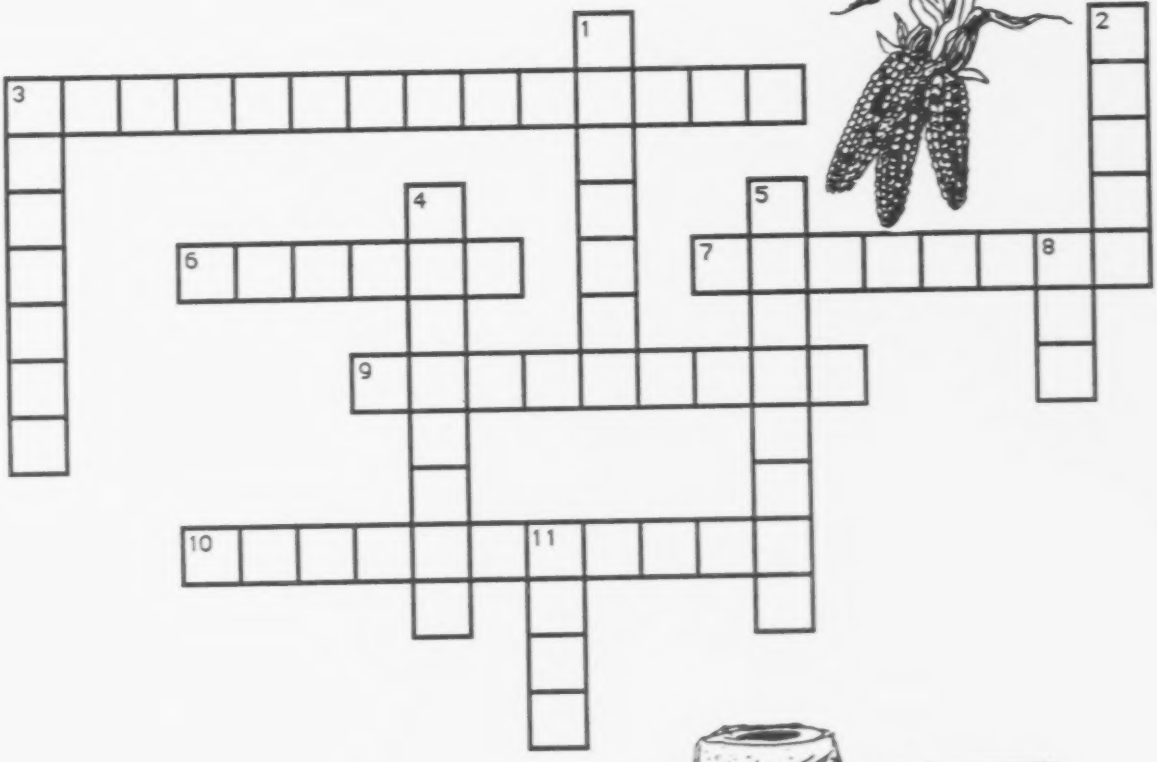
1. corn syrup
2. corn oil
3. feed
4. corn meal
5. corn flakes

by-products
fructose

Name_____Date_____

Directions: With the clues on the next page, complete the crossword puzzle using these words.

POPCORN	LIVESTOCK	BY-PRODUCTS
DENT	FRUCTOSE	KERNELS
EAR	PRODUCE	PHOTOSYNTHESIS
TASSLE	REFINERS	GRASS



ACROSS

1. the process by which plants seed make food from sunlight, water, minerals, and carbon dioxide

6. the male part of the corn plant

7. The United States _____ more corn than any other country.

9. Corn is used as _____ feed.

10. Paint, vinegar, crayons, and adhesives are all corn ___ - _____ .

DOWN

1. In 100 days one corn can produce an ear of corn holding 500 ___ .

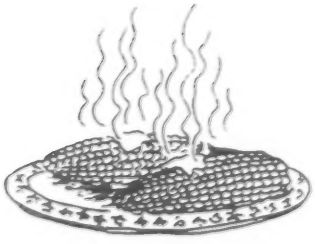
2. Corn is a _____ .

3. _____ , sweet corn, Indian corn, and field corn are all types of corn.

4. Corn_____ separate the corn grain into starch, hulls, germ gluten and liquids.

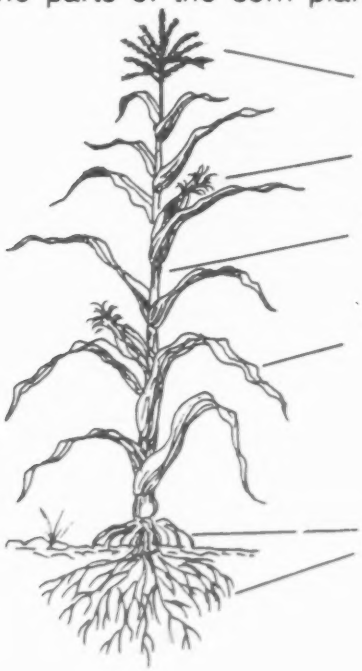
5. the proper name for corn sweetner

11. another name for field corn



Science Quiz: Corn **Name**_____

1. Name the parts of the corn plant.



a. _____

b. _____

c. _____

d. _____

e. _____

2. Where does photosynthesis take place?

_____

3. What is photosynthesis?_____

_____

_____

4. What are the end results of photosynthesis?

_____ and _____

5. What is dent corn?_____

_____

6. Exactly what is a seed of corn?_____

_____

7. What is fructose?_____

_____

8. Why are the roots of a corn plant different than most plants'?

_____

_____

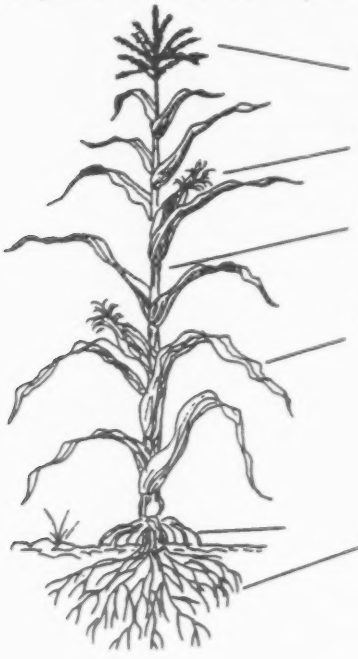
9. Name two products made from corn.

_____

_____

Science Quiz: Corn **Name ANSWER KEY**

1. Name the parts of the corn plant.



a. tassel

b. ear

c. stem (stalk)

d. leaves (leaf)

e. roots

2. Where does photosynthesis take place?

in the leaves

3. What is photosynthesis? plants making food from sunlight, water, minerals and carbon dioxide

4. What are the end results of photosynthesis?

food and oxygen

5. What is dent corn? field corn

6. Exactly what is a seed of corn? a kernel which will grow a new plant

7. What is fructose? corn sugar

8. Why are the roots of a corn plant different than most plants'?

the corn plant has roots above the ground for support.

9. Name two products made from corn.

fructose, by-products, corn oil, corn starch, corn meal, feed

ECOSYSTEMS-III E-1.2, 1.3, 1.4, 2.21, 2.22

TEACHER MATERIALS

CONCEPT: Ecosystems - III E - 1.2, 1.3, 1.4, 2.21, 2.22
Reading - Comprehension

OBJECTIVE: The students will be able to describe/draw a food chain and food web.

BACKGROUND: Our food system is very complex. But not any more so than that of other animals. In order to obtain all of the necessary vitamins, minerals, amino acids and energy, animals consume a wide variety of foods.

Agriculture utilizes the fact that plants store energy, and animals consume and convert that energy. In other words, agriculture provides humans with the energy and other nutrients needed to keep our bodies running.

ACTIVITIES:

1. Have the students read "The Food Chain."
2. Have the students read "The Food Web."
3. Have the students complete the drawings of a food chain and a food web.
4. Play "The Food Web Game" with the class.
5. Make use of the quiz.

VOCABULARY

Chlorophyll: _____

_____

Pigment: _____

_____

Photosynthesis: _____

_____

Herbivores: _____

_____

Predators: _____

_____

Carnivores: _____

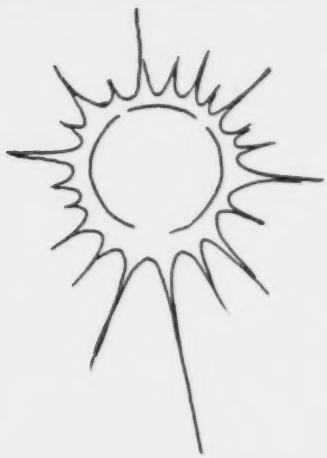
_____

Omnivores: _____

_____

THE FOOD CHAIN

Plants make their own food from sunlight, minerals, water and carbon dioxide. All of the world's animals depend upon that fact. This food production is called photosynthesis."

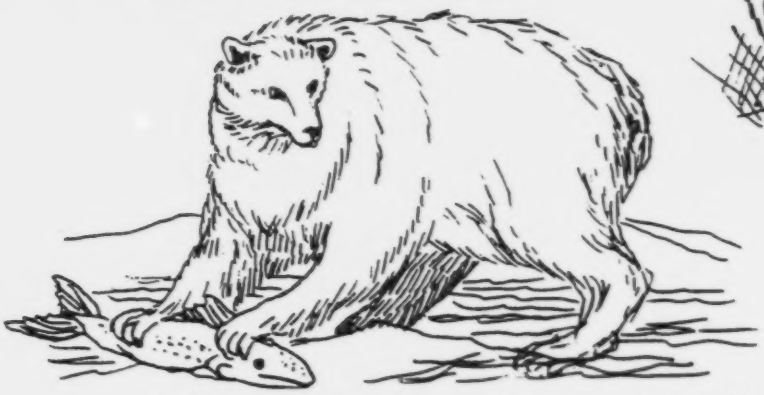


The plant takes in sunlight, water, carbon dioxide and minerals and produces food and oxygen with the help of a pigment called "chlorophyll." Chlorophyll is what makes plants green.

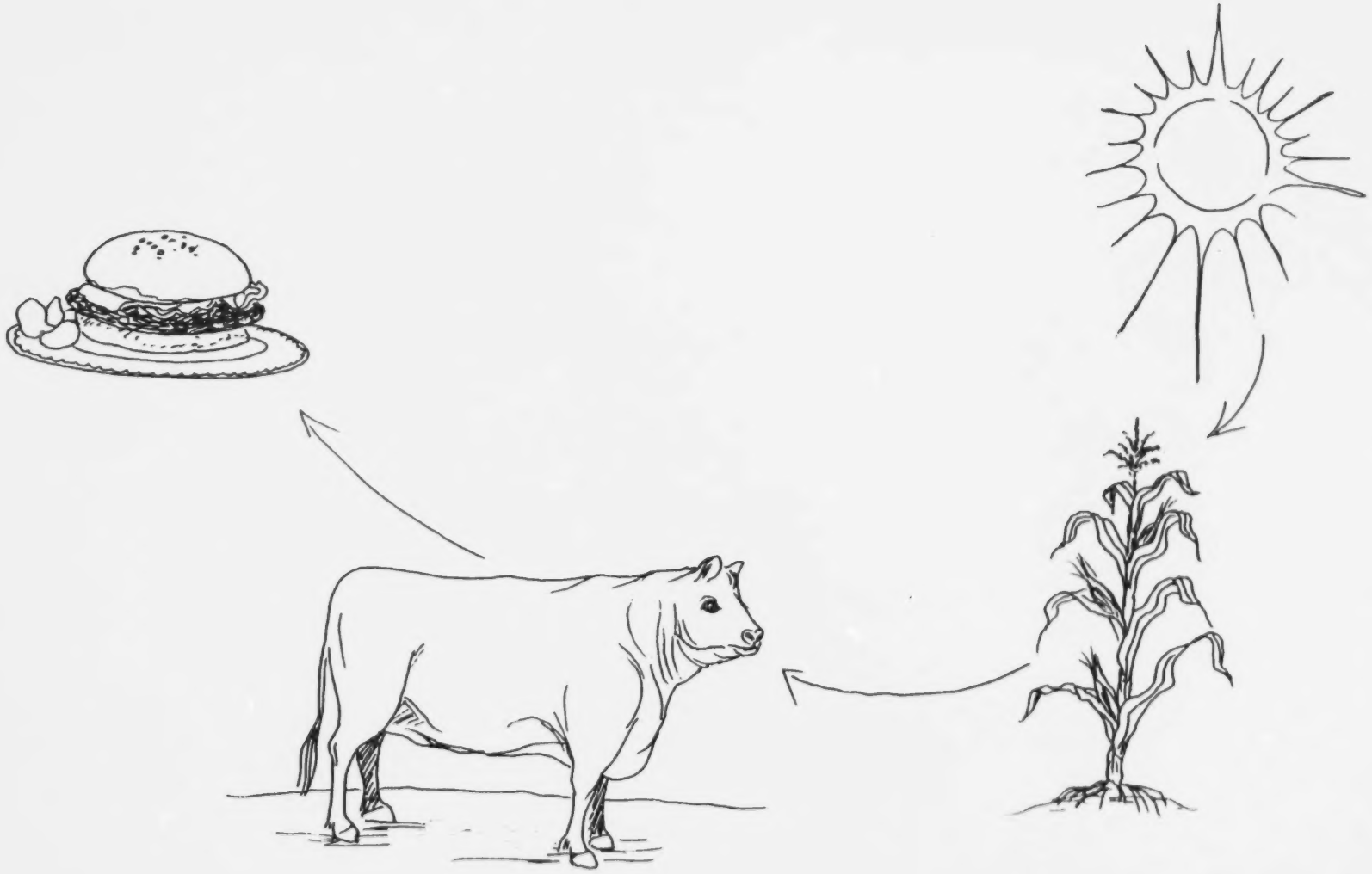
Then the plant stores food or makes seed. It is this stored food that enables animals to exist. Animals eat the plants for food. Animals that eat only plants are called herbivores.

Some animals live by eating other animals. These animals are called predators. Predators which eat only other animals are called carnivores.

Some animals, such as bears, eat both plants and animals. These animals are called omnivores. Humans are omnivores.



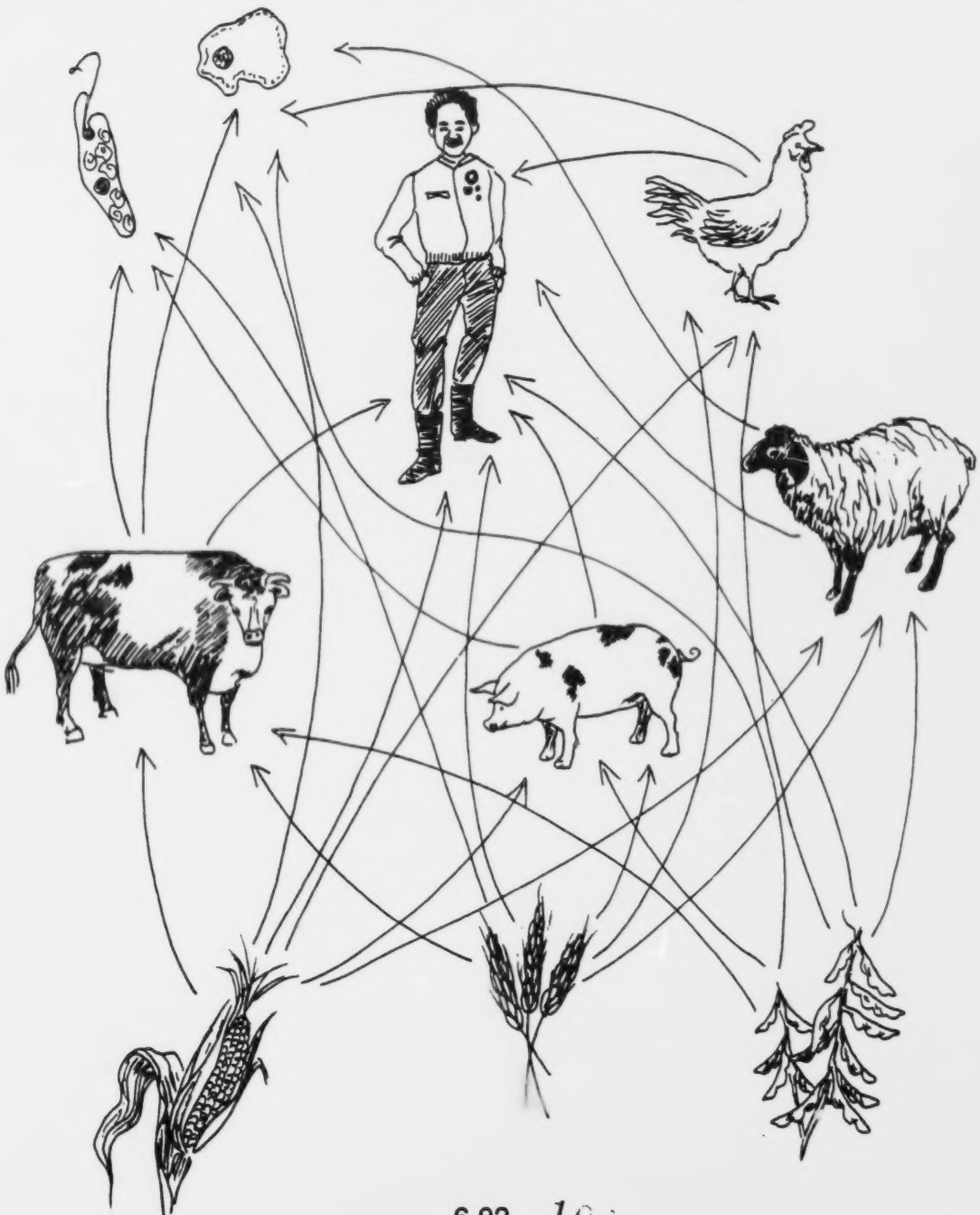
Animals don't make their own food. If plants did not exist, animals would not exist. A food chain describes plants making food from light, herbivores eating plants, and carnivores eating herbivores.



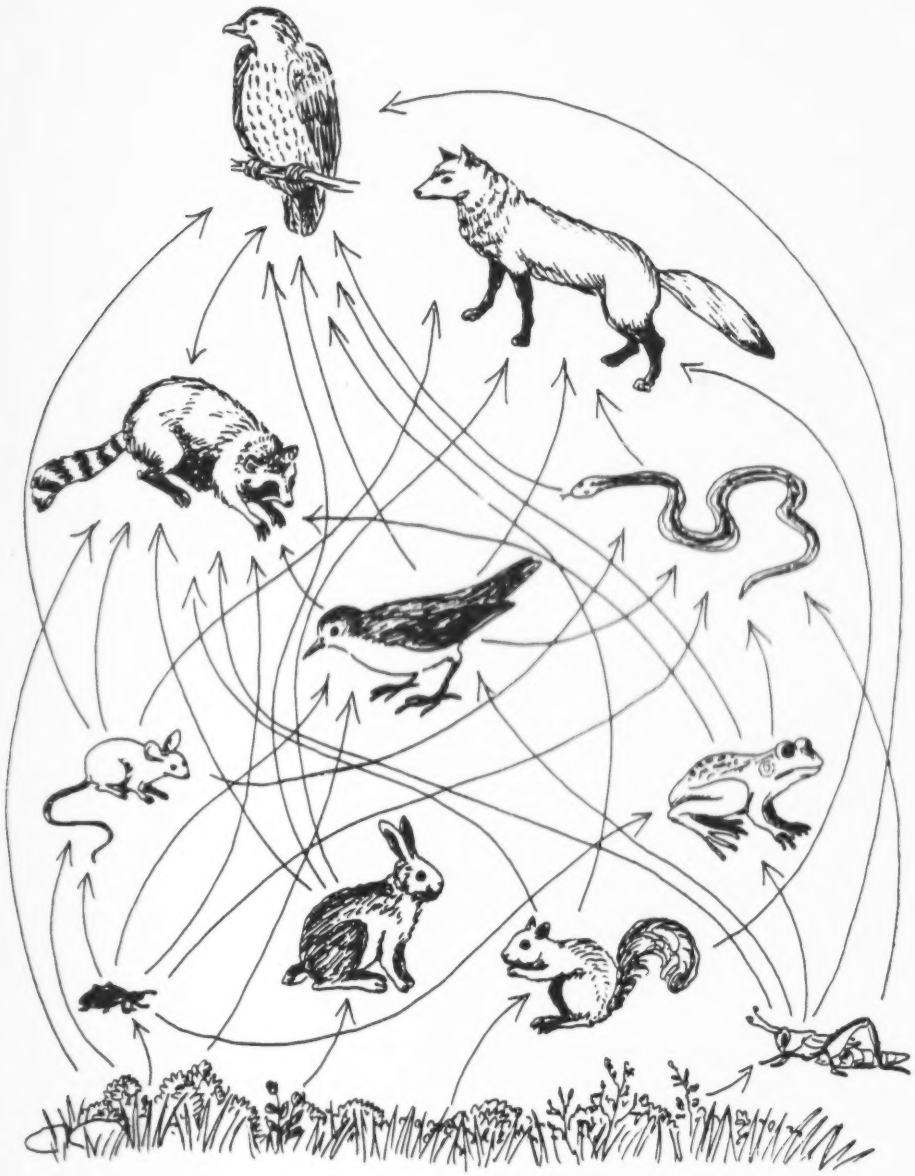
6-91

THE FOOD WEB

Humans are omnivores. We eat plants and animals. In nature, simple food chains don't really exist. It is much more complicated! Instead, we have food webs. Humans eat many plants and animals. Those animals eat many different plants. Some of the plants that we do not or cannot eat are eaten by animals. A food web would look like this:



A food web gets even more complicated when carnivores eat carnivores such as this:



It becomes very complex! Draw your own food chain and food web on the worksheet.

ECOSYSTEMS

Name _____ Date _____

WORKSHEET

Draw a food chain:

Draw a food web:

THE FOOD WEB GAME

MATERIALS:

1. One large ball of yarn or string- symbolizing energy.

2. One classroom of students standing in a circle with one student standing in the center holding the yarn.

ACTIVITY:

1. The center student is the sun.

2. Give all other students a title:

cow	hawk
frog	blue bird
snake	
grass	bear
wolf	apple tree
blueberry bush	crow
corn	birch tree
pine tree	eagle
blackbird	swine
lamb	wheat
deer	bee
chicken	raccoon
great blue heron	fish
fly	mosquito
fox	human

3. Make sure the mixture is 1/2 produce and 1/2 consumer.

4. The "sun" tosses the ball of yarn to a student with a plant title, holding on to the end of yarn (so the ball of yarn will unravel). The student says, "I <u>give</u> my energy to..."

   or

   Send the energy back to the sun saying, "I got my energy <u>from</u>..."

5. The game continues until all of the energy is used up. Each new student receiving the ball or energy must either send it to a higher consumer or on to the food it had consumed.

6. The teacher can control how "Webby" the game becomes by instructing the student whether they have to send the energy to their predator or to their prey.

7. When the game is done, either the students must reverse the process and wind up the yarn or the teacher can designate the sun to wind up the energy.

8. To demonstrate the effect of a species extinction, have that species pull their yarn to see who else is affected down the line.

ECOSYSYEMS

Name_____Date_____

QUIZ

1. Match the answer on the right with the best description on the left:

_____1. plants make food	A. chlorophyll
_____2. animals which eat plants and animals	B. herbivores
_____3. predators	C. photosynthesis
_____4. pigment	D. carnivores
_____5. animals which eat only plants	E omnivore

II. Draw a simple food chain:

Draw a food web:

ECOSYSYEMS

Name ANSWER KEY Date _____

QUIZ

1. Match the answer on the right with the best description on the left:

C	1. plants make food	A. chlorophyll
E	2. animals which eat plants and animals	B. herbivores
D	3. predators	C. photosynthesis
A	4. pigment	D. carnivores
B	5. animals which eat only plants	E. omnivore

II. Draw a simple food chain:

Life Science - III A - 2.23, 2.4

TEACHER MATERIALS

CONCEPTS: Life Science - III A - 2.23 Animals build nests to provide shelter
- 2.4 Animal behavior- building shelters

Reading - for comprehension

OBJECTIVE: At the end of this unit, the students will be able to describe the house building ability of the hornet.

BACKGROUND: Humans are only one of a multitude of home builders in the animal world. Birds, ants, and alligators each build their won type of home. Surprisingly, some of the smallest animals build the most complex homes. The "paper wasp" is one such example. This lesson explores the complex home of the Baldfaced hornet (commonly called the paper wasp).

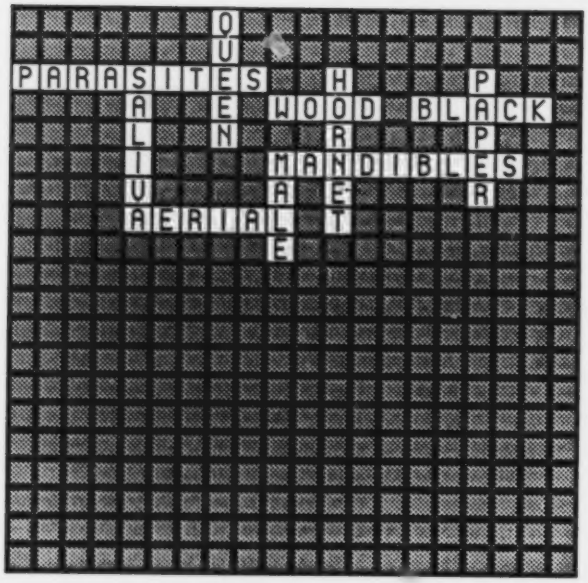
The study of insects is called entomology. The students will become amateur entomologists while studying these insects and their home.

ACTIVITIES:
1. Collect a grey football-shaped nest of a hornet or yellowjacket (see instructions).
2. Have the students read "The Paper House Builders."
3. Review the life cycle of a yellowjacket or hornet with your students, explaining nest building as the colony grows.
4. Dissect the nest you have obtained (see instructions).

5. Have the students complete the crossword puzzle "Paper House Builders."

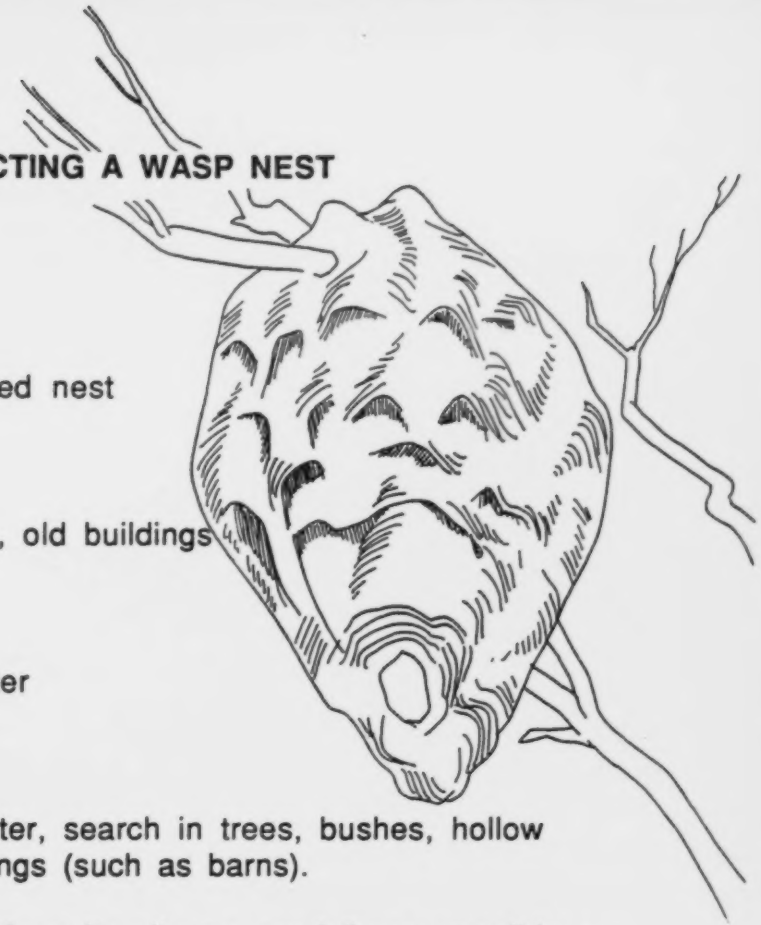
6. Before or after completing this unit, use the social studies lesson on paper.

Answers: Paper House Builders



*Information provided by Carolyn Klass, Senior Extension Associate, Department of Entomology, Cornell University, College of Agriculture and Life Science.

COLLECTING A WASP NEST



What?

A grey football-shaped nest

Where?

Trees, shrubs, barns, old buildings

When?

Late fall, early winter

How?

1. In late fall or winter, search in trees, bushes, hollow trees or old buildings (such as barns).

2. Remove the nest from its site as carefully as possible - IT IS PAPER! You may need to clip off the branches that hold it.

3. Place the nest gently into a good plastic garbage bag and add an open No-Pest Strip (Vapona insecticide strip). Follow No-Pest-Strip directions for use.

4. Seal the bag.

5. Bring the sealed bag into a warm room.

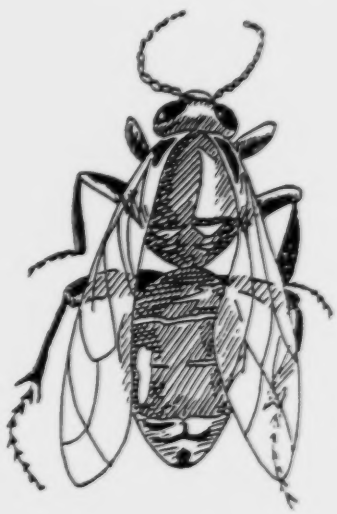
6. Leave the nest sealed in the garbage bag with the No-Pest-Strip for a minimum of one week.

7. The hornets are annual nesters. They construct a new nest each year. But a few individuals may still be alive. A week with the No-Pest-Strip will kill these. It is now "safe" to open the nest and work with it.

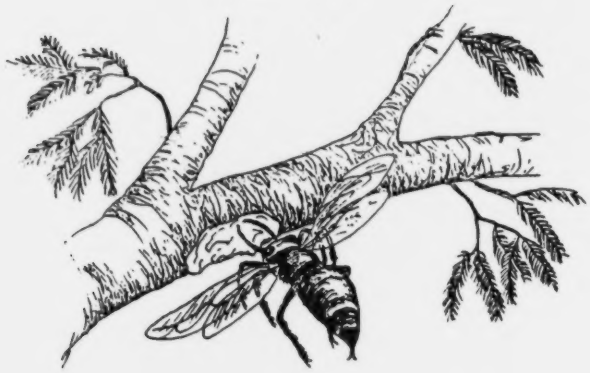
THE PAPER HOUSE BUILDERS

Many animals build their own homes. Birds build nests to incubate their eggs and care for their young. Ants dig an intricate system of tunnels to store food, lay eggs and rear young. Even in swamps we find home builders. The female alligator builds a raised nest to incubate her eggs. Some of our smallest animals, the insects, build the most intricate homes. Insect homes can be made of wax, bubbles, leaves, silk, mud or paper. They might even make a bubble home underwater.

The bald-faced hornet, sometimes incorrectly called a "paper wasp," makes a nest out of paper. The bald-faced hornet is black with white markings. It builds an aerial nest. An aerial nest is one that is up in the air. The whole purpose of the nest is to house the young. Unlike honeybees, social wasps do not store food.

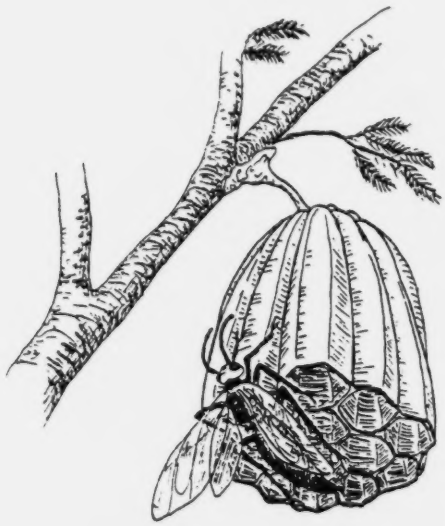


The queen hornet/yellowjacket spent the winter hidden under a tuft of grass in a field or under a piece of loose bark waiting for spring. She mated in the fall. When winter is well over the queen emerges from hibernation. At first she searches for a suitable place to construct a nest--often a tree or shrub branch. The hornets chew up wood and mix it with their saliva to make paper. The wood can be weathered wood from barns or houses, fallen trees in the forest that are rotting, dead twigs and leaves or little chunks of paper or cardboard. They chew this up thoroughly and mix it with their saliva until it becomes pulp.



When it is right for construction, the wasp spreads some on a chosen site (branch of tree or shrub). The wasp continues to produce more "paper mache," depositing it and spreading it out with the mandibles (jaws) as it works. The wasp always moves backward apparently so that she does not step on the newly spread pulp. The pulp is usually spread in a layer of uniform thickness. The individual pulp loads can often be seen as individual, colored strips.

When enough pulp is deposited as a "foundation " for her nest, she begins to construct some cells. When a few cells are completed, she lays a single long, slightly curved egg in each cell.



Two or three days later, the tiny grayish-white larva hatches. It is legless and shaped much like the egg from which it hatched. The tiny larva is held in the cell by a gluey secretion (otherwise it would fall out due to the force of gravity).

Each day the queen feeds her larvae freshly killed insects (often flies or caterpillars) which she has chewed up for them. This type of feeding lasts 10 to 12 days.

When the larvae are fully grown, they spin a little cocoon-like cap of silk over the cell and undergo a transformation to become a pupa.

The pupa is encased in a thin transparent membrane. At first the pupa is a creamy white replica of its mother, but as the days continue, the pupa changes color. After 12 or so days, the pupa is ready to emerge as an adult. It breaks the membrane, chews through the silken cap, and emerges as an adult.

The first brood always contains workers. These workers will take care of successive broods, allowing the queen to get on with egg laying. The workers forage for food, enlarge the nest to make room for the enlarging colony and take over complete care of the young.

The size of the nest tells how successful the colony was through the summer. The larger it is, the more eggs were laid, larva cared for and new workers hatched.

Sometime in August the queen lays unfertilized eggs. These eggs develop into males. The fertilized females which are produced late in summer are better fed. These females become queens, mate and go into hibernation. A successful nest will produce 100 to 200 queens and 3,000 to 4,000 individuals Why don't their numbers increase? Many are killed by predators and parasites.

DISSECT THE NEST

Examine the entire nest:

1. Feel the surface -- break off a small piece and examine it.

2. What is it made of ? (A material similar to paper mache).

3. Do you see different colors on the exterior of the nest?

4. Note the nest opening: Where is it? Is it on the top, side or bottom? Can you think of reasons for having the opening where it is? (rain, wind)

5. Carefully remove the outer "paper" layer from one side of the nest. This "paper" may be a little difficult to remove in some places.

   Another way to open the nest is to use a hacksaw (fine tooth saw) or a serrated kitchen knife. Cut through it carefully. Clamp the main supporting branch in a bench vise to hold it steady while cutting.

6. Is the paper covering thicker on the top or bottom?

7. Look inside -- what do you see? There should be a number of "tiers" of comb, often 3 or 4.

8. How is the comb attached to the nest?

9. Remove more of the nest cover if you cannot see how the combs are attached.

10. Next, remove (cut off from one above) one of the sections of comb. What shape are the cells? (Six-sided).

11. Count the number of cells in the comb. Are they all empty? Or are some of them still "capped" (covered over)?

12. If you find some of the cells are still capped, carefully remove the caps. What's inside?

    A pair of tweezers or forceps may be useful in extracting what's inside.

    (Note to teacher): Some of the cells may contain fully developed hornets or yellow jackets that did not make it out of their cells before the cold weather killed them.

13. The large "queen cells" are used only once for laying eggs. However, the smaller worker brood cells may be used up to three times.

    Count the queen cells in other combs. How many were there?

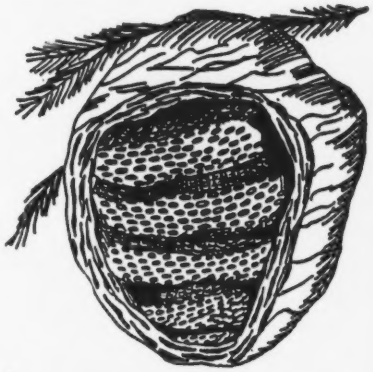
14. Also count the worker cells in your combs. Multiply these times three. When you add the total from questions 13 and 14 together, you will be able to tell how many hornets or yellow jackets developed in your nest.

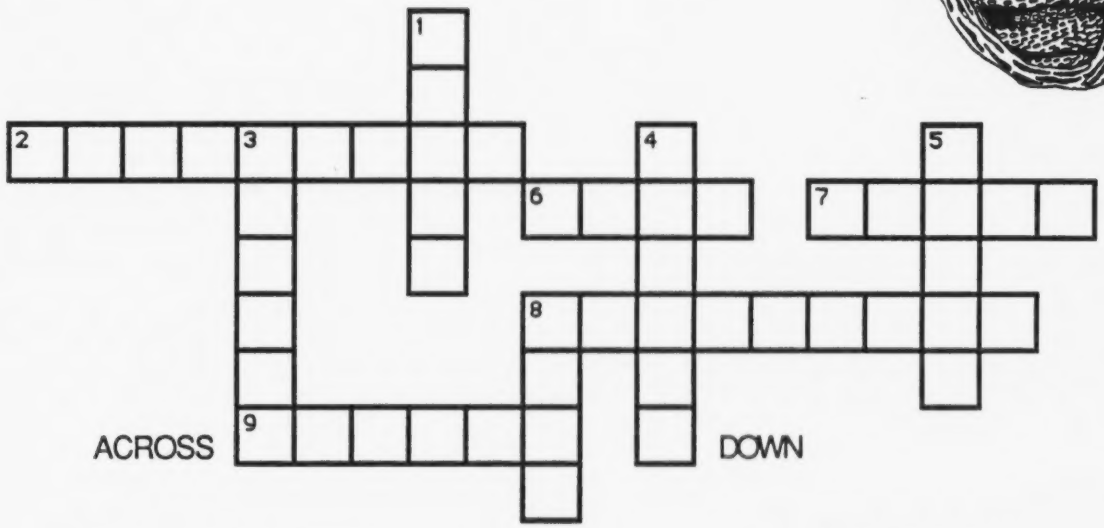
Name_____Date_____

PAPER HOUSE BUILDERS

Directions: Use these words to complete the crossword puzzle:

AERIAL	MANDIBLES	QUEEN
BLACK	PAPER	SALIVA
HORNET	PARASITES	WOOD
MALE		





ACROSS

2. Predators and _____ prevent hornets from over producing.
6. materials hornets make paper from
7. color of the bald-faced hornet
8. Jaws are called _____ .
9. nests above the ground

DOWN

1. well fed female
3. Wood and _____ = pulp for the nest.
4. The "Paper Wasp" actually a _____.
5. A house of_____ is made by the bald-faced hornet.
8. Unfertilized eggs become ____ hornets.

TEACHER MATERIALS

CONCEPT:

Social Studies
- technology
  (geographic page 96)
  (historic page 106)
- change
  (social pages 46, 52)
  (historic pages 104, 106)

Reading
- comprehension
- vocabulary

OBJECTIVES: The students will learn to make paper. The students will gain an understanding of the process of commercial paper production. The students will be able to list uses of paper and trees today.

BACKGROUND: Since the Egyptians first used papyrus, many forms of paper have been developed. Today, paper comes in many forms: newsprint, writing paper, sandpaper, cardboard, tissue, and insulation. The method of papermaking in this exercise is very similar to the ancient Chinese method.

ACTIVITIES:

1. Make copies of the materials and have the students read "Making Paper."
2. As a homework assignment, have the students list as many types of paper as they can think of and fill in the worksheet.
3. Have the students define the vocabulary words.
4. Include the vocabulary words in spelling lists.

5. Have the students make paper as shown.

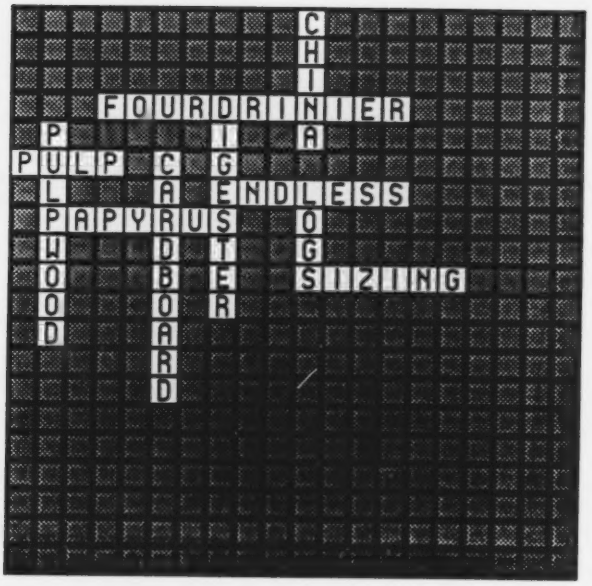
6. Ask: "What would life be like without paper?" or "What would life be like without trees?"

7. Have the students complete the crossword puzzle.

8. Discuss recycling. (In the story it says that paper production usually begins with a tree. The exception is the recycling of paper products).

9. Use the science unit on wasps and discuss their paper production.

Answers: PAPER



Name_____ Date_____

VOCABULARY WORDS

Papyrus: _____

Volume: _____

Production: _____

Pulpwood: _____

Cords: _____

Papermill: _____

Conveyor: _____

Chipper: _____

Digester: _____

Soggy: _____

Bleached: _____

Sizing: _____

Resin: _____

Blotting: _____

Starch: _____

Formation: _____

MAKING PAPER

The world's first paper makers were probably hornets. Wasps and hornets chew wood, twigs and leaves of trees and build circular nests for overwintering. Maybe man first thought to make paper from watching some of these tiny creatures. We will never know. What we do know is that one of the earliest forms of paper was created by the Egyptians. Papyrus was made from a type of reed which grows in Egypt. Papyrus was very stiff and smelled. The word "paper" comes from the word "papyrus."

Today's method of paper making was first developed nearly 2,000 years ago in China. The Mayans, Aztecs, and South Sea Islanders all developed their own paper made from wood or bark. Europe's first paper mill was built in Spain in 1151: America's in 1690. The process in use today was developed in 1800 by Nicholas-Louis Robert in France. The Fourdrinier brothers improved Robert's machine and patented it in England. This machine made volume production possible. It produced paper on an endless wire screen.

Paper production today usually begins with a tree. In a forest, trees are chosen as pulpwood trees. These are cut into standard lengths, measured in cords (4' x 4' x 8'), loaded onto trucks and hauled to the papermill. The logs are placed on a conveyor belt and fed into a giant drum. This drum rotates and strips away the bark with either steam or water. The cleaned logs are then ground up into cereal-sized chips by a chipper.

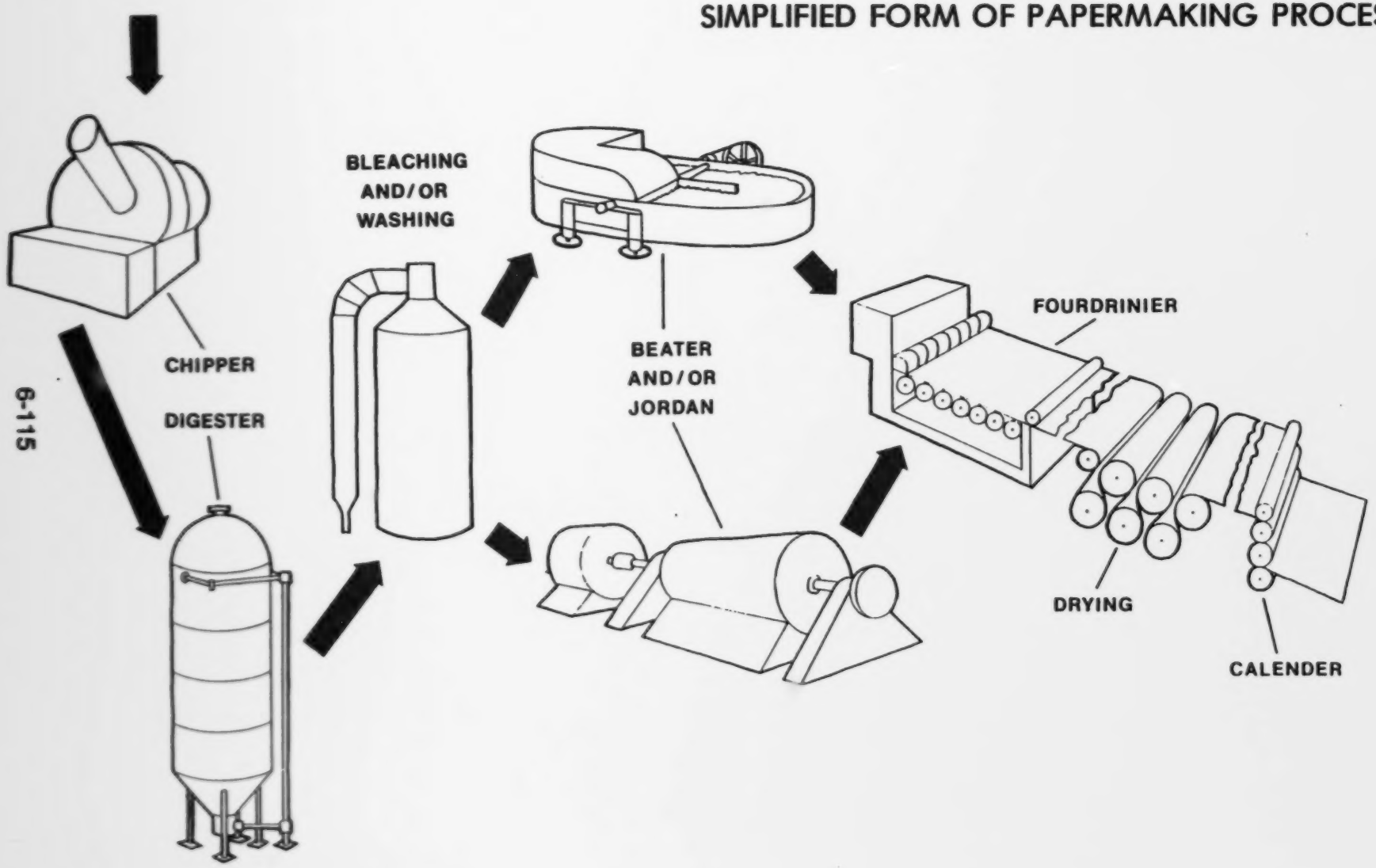
The cereal-sized wood chips then travel by conveyor to a ten-story high digester. These digesters are shaped like rockets and are sometimes called "pulp cookers." Chemicals and steam break the chips down into soggy globs. The globs are washed, sometimes bleached, and the chemicals are removed. We now have fibers called pulp. If needed, colored dyes are added.

To the pulp, "sizing" or resin is added. The sizing gives the paper whatever finish is needed. The pulp is now ready for the Fourdrinier machine.

Pumps spray a thin film of pulp onto the fast-moving, endless screen. Water drops away and the fibers are matted into paper. The damp paper is picked up by hot rollers which press and dry the paper. It is then rolled and cut into many sizes.

Today's paper comes in thousands of sizes, shapes and forms and has many uses: newsprint, coated papers for magazines, book paper, stationery, envelopes, paper bags, gasket paper, blotter paper, tissue paper, cardboard, automotive felts, milk cartons. The list is almost endless. High-quality paper often contains cotton fiber. Heavy grades of paper are used in industry and in construction businesses. How many types of paper can you name?

SIMPLIFIED FORM OF PAPERMAKING PROCESS



Name_____Date_____

Paper comes in many shapes and sizes today. Look around and see where paper is used in your world. List as many different products made of paper as possible. For example -- milk cartons.

MAKING PAPER

Materials needed for each team of 2 students:

1. A fine-mesh screen.

2. A metal pan: aluminum frozen food tray (easiest), old baking pan, or refrigerator tray.

   a. Trim the screen to fit inside the pan.

   b. Cut out the bottom of the pan, leaving a 1/2 inch wide ledge to hold the screen.

3. A forming rack or mold.

   a. This can be made from a second pan that will fit inside the first.

   b. Cut out the entire bottom, leaving only the sides.

4. A basin that will hold at least 10 quarts of water.

5. 25-30 sheets of an inexpensive facial tissue - make sure it is not lotionized or "wet strength."

6. Two sheets of blotting paper - pan size for each student.

7. Laundry starch -
   a. One tablespoon of instant starch in two cups of water will produce what is known as "size" to commercial paper makers.

   b. Make sure it is <u>not</u> corn starch, but laundry starch.

8. An egg beater or blender.

9. A rolling pin.

10. An electric iron.

11. Scissors.

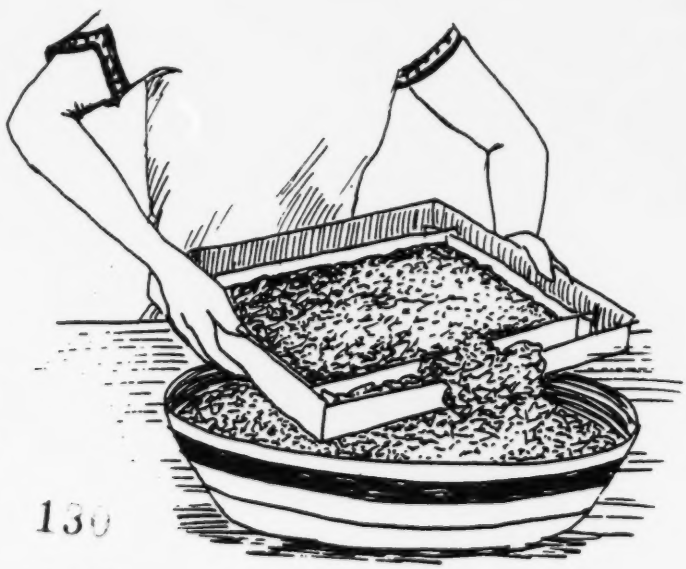
MAKING PAPER

Step 1

Tear up sheets of tissue and put in basin. Add starch mixture (1 T in 2 cups of water) and additional water to equal 10 quarts. Beat or blend the mixture thoroughly. This is the pulp.

Step 2

Prepare the paper formation mechanism. This consists of the pan, screen and forming rack.



Step 3

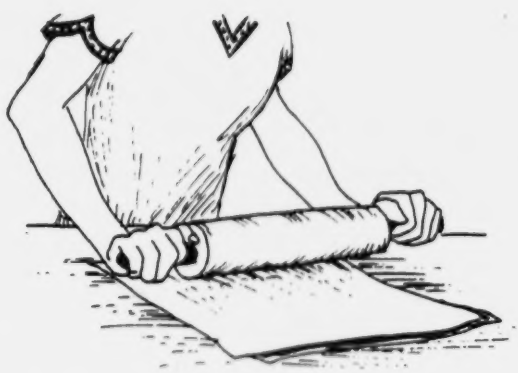
Hold the forming rack firmly on the screen and dip it sideways into the pulp mixture.

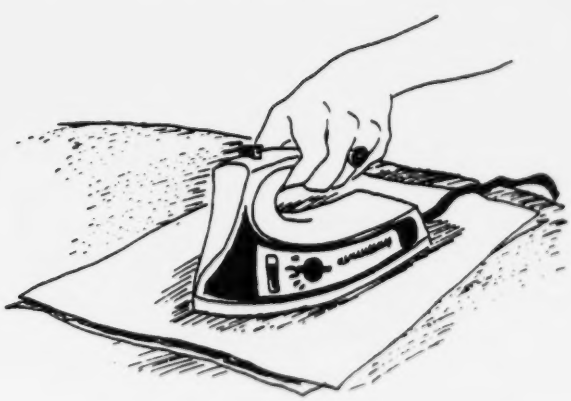
Step 4

Clean off the excess pulp outside the forming rack. LIft out the screen covered with pulp.

Step 5

Dry the screen and wet sheet of pulp between two pieces of blotting paper. The pulp sheet will stick to the blotting paper. Press out the excess water with a rolling pin.





Step 6

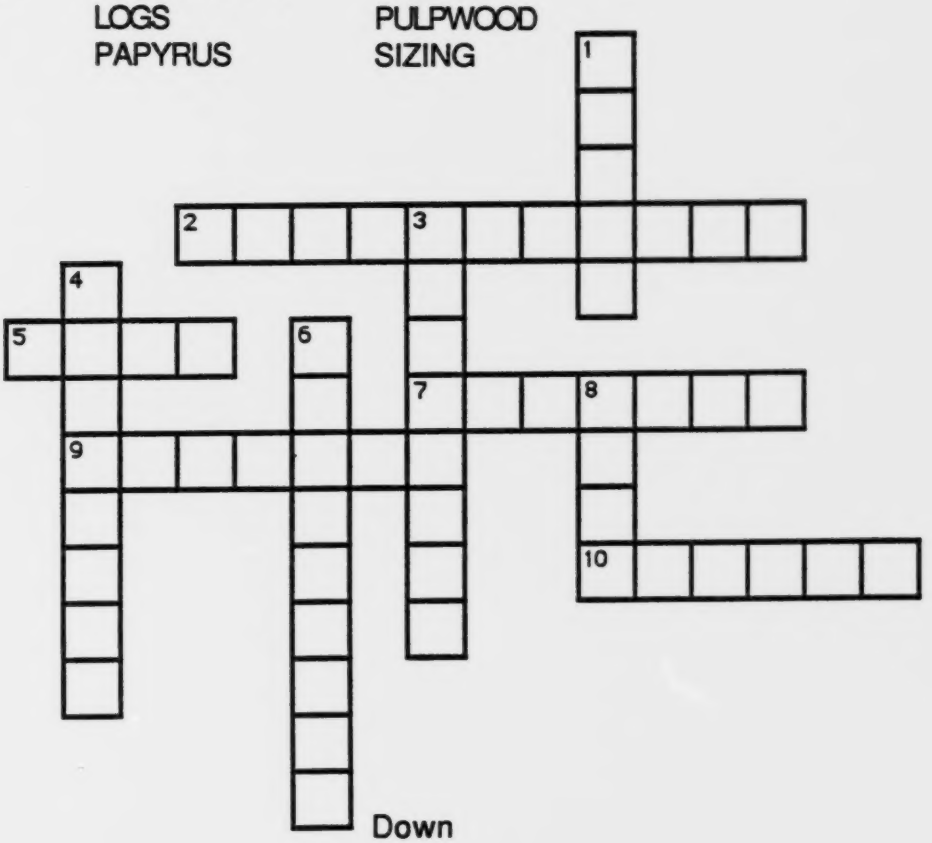
Iron the new sheet and blotting paper until dry (not too hot). The new sheet or paper will separate. Trim the edges of the new sheet with scissors. A new sheet of handmade paper is created.

Name_____Date_____

PAPER

Directions: Use these words to complete the crossword puzzle:

CARDBOARD	FOURDRINIER	PULP
CHINA	LOGS	PULPWOOD
DIGESTER	PAPYRUS	SIZING
ENDLESS		



Across

2. brothers who patented the machine used today to make paper
5. mixture used to make paper
7. Today's paper is made of an _____ wire screen.
9. Egyptian form of paper
10. _____ provides the finish on paper.

Down

1. country which first invented the making of paper
3. tall rocket-shaped structure
4. type of trees chosen to make paper
6. heavy paper used to make boxes
8. _____ are first fed into a chipper to begin papermaking.

TEACHER MATERIALS

CONCEPTS:

Social Studies
- technology (geographic page 96)
- interdependence (economic pages 64, 66, 68, 76)
- scarcity (geographic pages 88, 92)
- environment (geographic pages 88, 92, 94, 96)
- change (geographic page 96)
- citizenship (geographic page 94)

Reading
- vocabulary
- comprehension

Composition
- to describe

Life Science
- III A - 2

OBJECTIVES:

1. The students will comprehend how complex agriculture (in the U.S.) and its related industries are.
2. The students will appreciate how interdependent we all are.
3. The students will understand that U.S. agriculture has changed into a complex and diverse industry.
4. The students will gain an appreciation for the role of the family farm.

BACKGROUND: Agriculture is no longer the simple life depicted by the "old MacDonald" image. These

three stories, and poster offer insight into the complexity of agriculture both from the production and processing end.

In addition, it is crucial for Americans to understand that nowhere in the world do people enjoy a greater abundance of food for less money. Combining this lesson with some of the mathematics activities helps to make this apparent. The majority of the people on earth are farmers; and the greatest source of energy to farm is still animal power. Many of the statistics in the Math lessons reveal the amount of time it takes a subsistence farmer to produce food.

ACTIVITIES:

1. Use the poster "Besides the Beef."

2. Have the students bring, to school, examples of those products and set up a display.

3. Discuss the use of the various products. What would they do without...?

4. Have the students read the "Three Family Farms" stories.

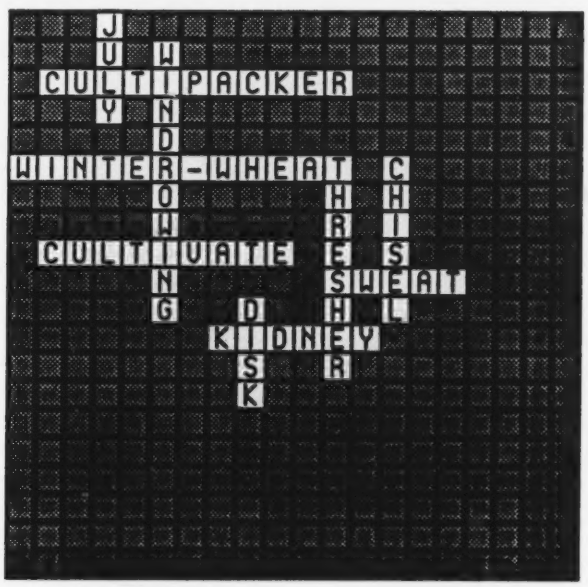
5. Discuss how complex each farm is. How does this differ from 100 years ago? 200 years ago? How does this differ from Mexican life? Chinese life? Soviet life? African life?

6. Use the information provided in the mathematics lessons to have a basis for comparison.

7. Discuss importing and exporting. Where do we get coffee from? (South America) Where do our soybeans go? (Japan) Where do we get wool from? (Australia and New Zealand) etc, etc.

9. Have the students select one of the farms and write a composition describing the activities on that farm.

Answers: **Three family farms.**



Name_____ Date_____

Vocabulary

Swine - _____

Dormant- _____

Combine - _____

Gestation - _____

Feeder - _____

Brood sows - _____

Disinfect - _____

Boar - _____

Manure - _____

Grains - _____

Farrowing - _____

Chisel plow (n.) - _____

Plow (v.) - _____

Soil erosion - _____

Economics - _____

Productive - _____

Moldboard plow - _____

Pesticides - _____

Herbicides - _____

Fertilizer - _____

Windows - _____

Nutritious - _____

Bale (v.) - _____

Preparation - _____

Attachment - _____

Alfalfa - _____

Steep - _____

Yield - _____
(not the same meaning as a traffic sign)

Cultivate - _____

Harvest - _____

Invested - _____

Fragile - _____

Threshing - _____

Export - _____

Disk - _____

Conservation - _____

Maintenance - _____

Equipment - _____

Thermostat - _____

Questions for discussion:

1. What ways do these 3 farms try to prevent soil erosion, prevent pollution and save energy?

2. How do these three farms interact with the world?

3. What can farmers do to use fewer chemicals?

4. Why should farmers be trained to use chemicals? Should everyone who uses pesticides?

5. Why do these farmers produce more than one product?

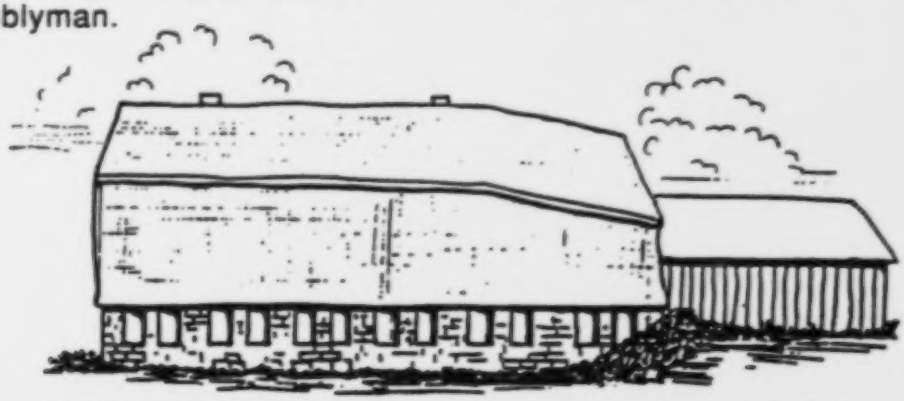
THREE FAMILY FARMS: Life on a Swine Farm

as told by Bruce Brown

I am 15 years old and live in Upstate New York on a very large swine farm. I am a freshman in high school. During the school year, my life is much the same as that of many of my friends. I play football and run track. I get up at 6:30 in the morning and am picked up by a bus at 7:30. I go to Waterloo Senior High School where I study Math, English, Social Studies, Biology and Spanish. After school, I go to sports practice until 4:30 or 5:00. At night, I do my homework, have dinner, watch T.V. and go to bed. On weekends, my life is different; I work on the farm.

We raise about 3,000 hogs on our farm every year. We farm about 600 acres of land where we grown hay, corn, wheat, and barley. Our farm employs two full-time men, my brother, and my father.

This barn is our breeding barn. It was built in 1895 by an Assemblyman.

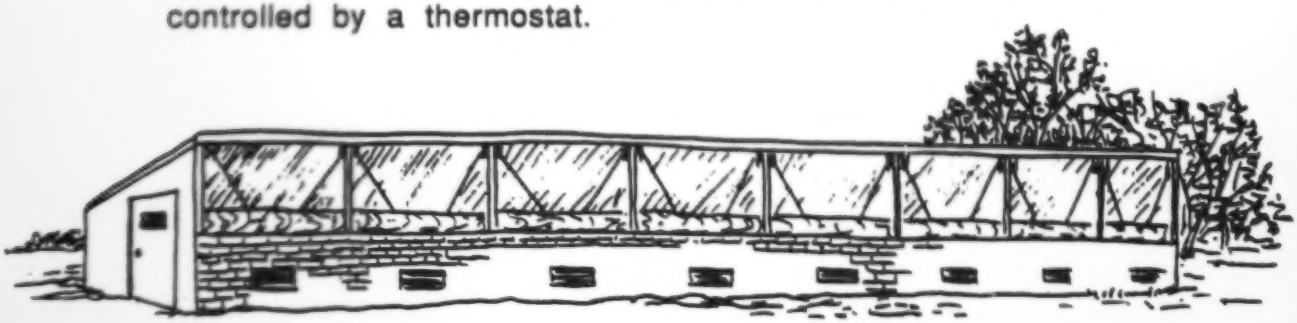


We have redesigned the inside to house our brood sows (adult females) and boars (adult males). We also have six other barns.

The gestation barn is where we house the sows while they are pregnant. There are two farrowing houses where the piglets are born. The pens in this building are specially designed so that the piglets are kept a 90 degrees Fahrenheit. We also have a cold nursery. The last barn is the finishing barn. All of

our pens are specially designed to make the animals comfortable. We got ideas for the barns while traveling throughout the Midwest and Canada.

Our finishing barn is called a modified open front barn. It is open in the front and covered with a curtain. The curtain is controlled by a thermostat.



The thermostat controls the temperature in the barn. If it gets too warm, a motor lowers the curtain and lets in cool air. If it gets too cool, the motor brings the curtain back up.

Swine are very clean animals (contrary to popular opinion). They leave their wastes in one area of the pen, usually as far from their food as possible. On that part of the floor we have concrete slats with a gutter underneath. Manure and urine fall through the slats, down into the gutter. An automatic electric scraper pushes the manure down to the end of the barn. At the end of the barn, the manure is pumped into a huge holding tank. In this barn, the feeding system is all automatic too! There is a clock on the motor which controls feeding. At fixed times of the day, the feeder motor "kicks on" and the hogs are fed. We control the time the feeding takes place and how much each pen is fed. The older and larger hogs get more feed.

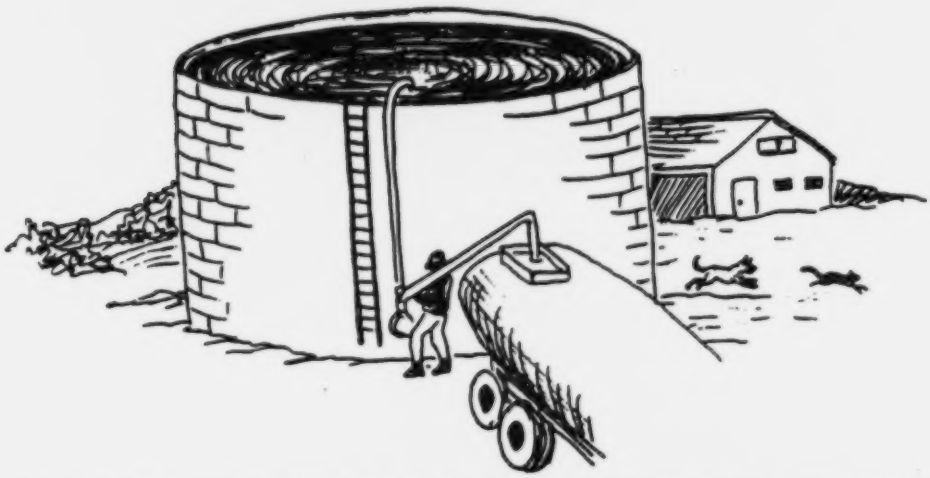
The work that I do on weekends changes with the seasons. Our first priority is the hogs, of course. No matter what season it is, they need to be cared for. In general, I move hogs, feed hogs, give shots, castrate, and help with farrowing. I also help to grind feed and clean pens. After each group of hogs is moved out of a pen or barn, we steam clean the pen to disinfect it. This helps to prevent disease. Swine can get many different diseases. Some of these diseases can kill hogs. It is much better to prevent disease than to try and treat it.

WHEAT

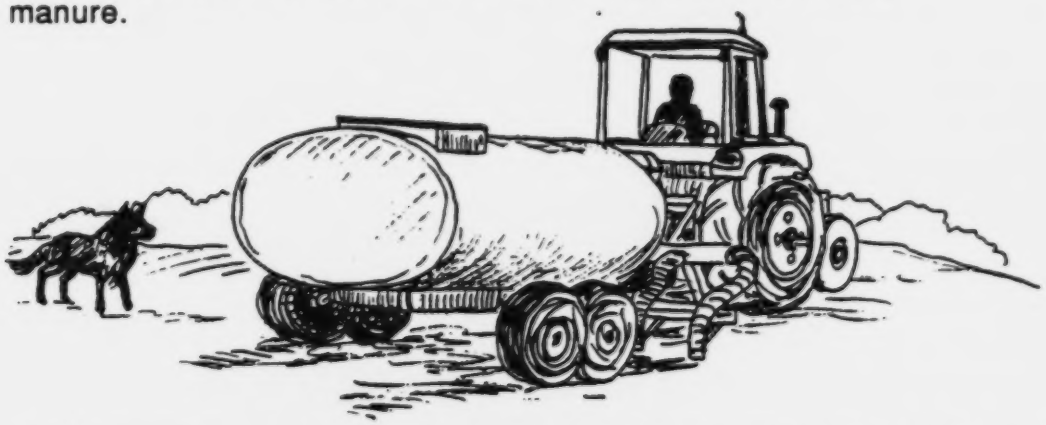
Seasonally, the work changes. During the fall, we plant wheat. First, we plow the soil with a chisel plow. A chisel plow is a fairly new piece of equipment. It doesn't disturb the soil as much as the traditional plow which is called a moldboard plow. This helps to prevent soil erosion, saves fuel and takes less time. After we chisel plow, we disk the soil with an offset disk. This breaks the soil into small lumps and mixes in crop stubble. Next, we use a field cultivator and cultipacker. The cultivator is like the chisel plow but smaller. The cultipacker has a series of steel wheels which are very heavy. The cultipacker smashes the soil lumps into fine particles. The idea is to break down the soil into a lot of very small particles so that the seeds will come into contact with them. It is important for the seed to come into contact with the soil so that water reaches the seed. Now, we plant. Planting wheat seed is called sowing (it sounds like sewing).

The grain drill sows the seed into close rows. We follow this with the cultipacker once again. This pushes the soil over the seed and makes that important contact that I mentioned. It may seem strange that we plant wheat in the fall just before the winter.

Doesn't it die? No, it is a specially bred grain. Winter wheat grows in the fall, becomes dormant in the winter, and regrows in the spring. Planting winter wheat gives the farmer a head start in the spring. It can grow when it is too wet for the farmer to take heavy equipment onto the field.



In the fall, we unload that huge manure storage tank that I told you about. This tank holds 1/2 million gallons. When we empty it, we use the manure to fertilize the fields. The manure is liquid. It is pumped into a tank that is pulled behind the tractor. We take the tank out in the field and inject the manure into the soil. The manure is injected into the soil instead of spread on top of the soil to keep odors down and prevent the nutrients in the manure from escaping. We don't want to pollute the air or lose the fertilizer value of the manure.



The last major job in the fall is to harvest the corn. We combine the corn. The combine picks the ears of corn off the stalk, husks the

corn, and shells the corn. In other words, it gives us just the corn seed, no husk or corn cob. Then, the corn is dried. The corn is stored in one of our storage bins or the silo.

During the winter, life is usually pretty easy. We usually care for the hogs, plow snow and relax on a vacation.

Then along comes spring! In the spring I work in the fields both after school and on weekends. First, we work the fields up the same way that we did for wheat. Then we plant corn and barley. This is almost the same except that we put weed killer on the field at the same time. With spring comes visitors. People from Africa, Europe, Canada and all over the U.S. have been to our farm to study our methods. This sharing helps the world produce more food.

During the summer we cultivate the corn and fertilize it. We also make hay. We bale about 75 acres of hay. Next, we harvest the wheat and then barley and bale up the straw. We also manage to squeeze in the county and state fair and run an ice cream stand during the summer. I also belong to 4-H and I sell my market hogs at a special auction and get a very good price for them.

The best thing about living on a farm is having my friends over. They really like to visit. A lot of kids look down at farmers. Once they visit our farm, see how much work we do and how many different things we have to know, they respect farming. They are also surprised that the hogs are so clean. Our hogs never wallow in mud. A pig will wallow in mud if it is outside because it can't sweat like other animals. The mud or dirt keeps the pigs cool. Since our hogs live indoors and we control the temperature, they stay clean. Pigs are very clean animals. The worst thing about living on a farm is that I am the boss's son. My brother and I have to do all of the work nobody else likes to do.

My brother just graduated from college in agriculture and is working on the farm with my dad. I plan to go to college and major in business. I would like to become a business manager. We just bought a computer for our farm. We will use it to keep up to date with the economics of agriculture. All of our records will be kept by computer in the future.

Speaking of the future, we are also involved in research. Cornell University has conducted research at our farm to make the swine industry more productive. Trying out new ideas in a real life situation makes research realistic.

I hope that I have helped you to understand what life is like on this kind of a farm. I think everyone needs to understand where their food comes from and how hard we work to give you a healthy, high quality food.

THREE FAMILY FARMS: Growing Kidney Beans

as told by Eugene VanOpdorp

The 600 acre VanOpdorp family farm produces crops. The major crop is kidney beans. Most of the beans we grow are exported to Mexico. Kidney beans have been developed from beans the American Indians grew. It is a native American plant. In addition to myself, our farm supports my parents and my brother, Jim. I also have two sisters, one married and working and one in college.

Our day begins with feeding 25-30 beef animals at 8 o'clock. Then we do whatever work is in season. In the spring, we work up the soil and plant. In the summer, we cultivate, fertilize, make hay, harvest wheat, and bale straw. In the fall, we harvest kidney beans and corn. In the winter, we do maintenance work on the equipment, relax and take a vacation (if we have had a good year).

The major moneymaker on our farm is the kidney bean crop. We grow 200 acres of dried kidney beans, 250 acres of corn, 100 acres of wheat and 50 acres of hay. We don't raise just one crop because it may be a poor crop year or the price may be low. We also rotate crops on the field to keep the soil in good condition. So, we raise several crops. Let me tell you about growing kidney beans.

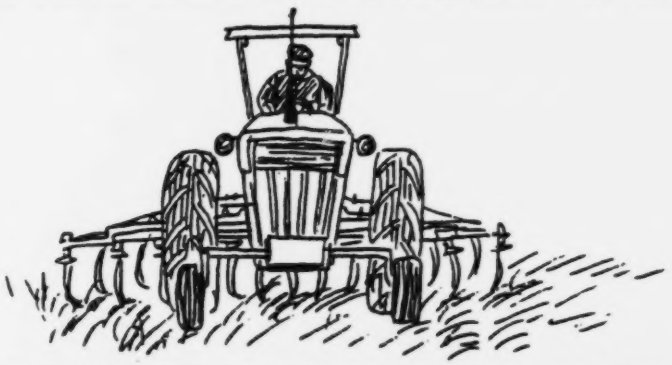
The first factor we have to consider in the spring is when to plant. How do we decide when to plant? First, the soil has to be warm. Beans are planted later than most crops so this isn't usually a problem. Secondly, there has to be water...but not too much! If there is too much water, the heavy equipment will cause the soil to pack down. Soil compaction prevents the roots from growing properly.

The third fact we must think about is when the crop must be harvested. We know how long each type of seed takes to produce a crop and we schedule around that fact. For example, one type of seed may take 60 days from the time the seed

sprouts until it can be harvested. Another may take 75 days. We also know how long the growing season is. We don't want to plant a crop that doesn't have enough time to grow and produce a good yield.

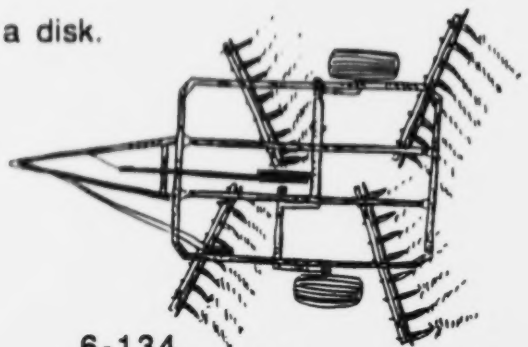
The last factor we consider is that we usually have a dry spell in July. We try to plan the planting of the beans so that the plants flower either before of after that dry spell. Of course, we can't really predict when it will happen, but we watch the weather cycles and have managed well. We usually plant beans between the 5th and 25th of June. As you can see, there is a lot involved in just deciding when to plant the kidney beans and we plant at least three other crops each year.

Kidney beans are a vegetable crop. Vegetable crops are more difficult to raise than field crops such as corn. They need to have very good soil preparation. The soil to seed contact must be very, very good. If it isn't, the seed will not grow. So, the soil must be worked up until it is very fine. We start by plowing the soil with a chisel plow. A chisel plow disturbs the soil less than a traditional moldboard plow. By using a



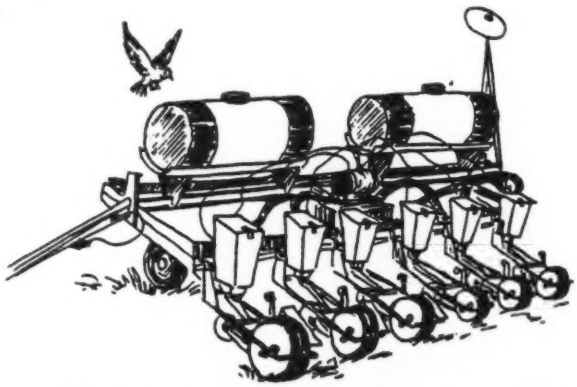
chisel plow, we help prevent soil erosion and use less energy. We have also used minimum till and no-till for the same reason. The chisel plow digs deep into the soil to loosen it up and give the roots room to grow. Then we disk the field.

This is a drawing of a disk.



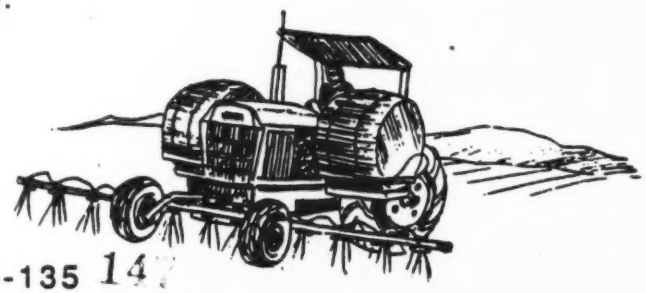
The disk is pulled behind a tractor. It breaks down the large clumps of soil into much smaller pieces. The disk we use is actually larger than this one. We follow the disk with a spring-toothed harrow and a cultipacker. The spring-toothed harrow and cultipacker smash the soil up into very fine particles.

Now it is time to plant. We plant the beans with a corn planter. We adjust it so that it can plant the beans. This is a corn planter.



Beans are planted every two inches in a row. About 95% of the beans we plant actually sprout and grow. We buy seed that is tested to make sure that it will germinate well. This is called Certified seed. When we plant, we fertilize the crop at the same time. We have our soil tested so that we know exactly how much fertilizer, lime and weed killers to use.

Right after planting, but before the plants begin to grow, we spray the field with weed killers. We are very careful to use only the amount required. If too much is used, it could run off of the field when it rains and enter streams or ponds. Or, it could remain in the soil and ruin next year's crop. We must have special training and pass a test in order to use these chemicals. If we don't take the class and pass the test, we can't buy the herbicide (weed killer) or insecticides (insect killers). This helps to keep us up-to-date on new sprays and safety practices. Different soil types and crops need different kinds and amounts of spray.



When the plant is growing well and bushing out (about four weeks later) we cultivate it. The cultivator is a smaller version of the chisel plow, but it is smaller and shaped so that it "digs" in rows. We cultivate to lessen pesticide use and make harvesting easier.

We rotate our crops to keep the soil in good condition; keep weeds, insects and diseases under control; and prevent soil erosion. It also helps us to use less chemicals. The insects and diseases which will hurt beans often don't infest other crops. So if we plant other crops, the number of insects and diseases drops. We can use fewer insecticides and herbicides this way. (Insecticides kill insects and herbicides kill weeds).

The beans grow a total of 75 days from the time they sprout until the plant begins to die, but it takes about 90 days from the time we plant the seed until we harvest. After planting, it takes some time for the seed to sprout. Before harvesting it takes time for the beans to dry. We begin the harvest between the 10th and 15th of September. How do we know when? Well, we check the beans. We look at the bean plants, pods, and then the beans themselves. The bean pods will begin to turn white. Then, we open the pods and look at the seed. When the seed begins to turn red and starts to dry out, it is time to pull the beans. It will take us about 30 days to harvest the crop of beans. First, the beans are pulled out of the ground with a special tractor. The tractor is small and has two blades on the bottom. The blades cut the roots and pull the plant out of the soil. Pulling the plant up dries it out faster and makes harvesting easier. Next, we put the beans into rows. This is called windrowing. The beans dry in the windrows until ready. Then, we thresh the beans out of the pods. The threshing machine picks up the windrows of beans and gently separates the beans from the pods. Gently because the beans are very fragile and the skins crack easily. (Compared to other threshing machines, a bean machine is gentle). If the beans are broken or the skins crack, the crop will not yield a good price. (The beans are canned, and if the skins are broken, the beans will not can well.)

From the threshing machine, the beans are transferred to a

truck and put into storage until we sell them. When do we sell and to whom? Well, we watch the market price. This involves determining how the harvest has gone in other states and how many beans are on the market. We sell to local companies which export. We store our crops on the farm and truck to the company when we are ready to sell.

On the next page is a list of prices for some of the equipment I have talked about. I hope this gives you an idea of how much money we have invested. Farming is a good life. I hope that someday this farm will be my own. It has its pluses and minuses, but I'd like to raise my family here and continue to farm.

Eugene VanOpdorp

LISTING OF EQUIPMENT AND PRICES

Price Guide for Corn and Kidney Beans

(Good used equipment)

	CORN	BEANS
COMBINE	6 row capacity with cornhead $28,000	6 row capacity $8,500
PLANTER	$2,500	$2,500
TRACTORS	150hp $22,000 100hp $13,000 75hp $ 8,500	$2,500 $2,500 $2,500
PULLERS	(Beans only) 2 row pulling unit with 30 hp tractor - $25,000	
CULTIVATOR (equipped for sidedressing Nitrogen into the corn field)	$2,000	$2,000
MOLDBOARD PLOW - 6ft.	$3,200	$2,000
DISC 21 ft., double offset	$3,200	
FIELD CULTIVATOR 24 ft.	$1,950	

THREE FAMILY FARMS: Cash Crops

as told by Scott DeCook

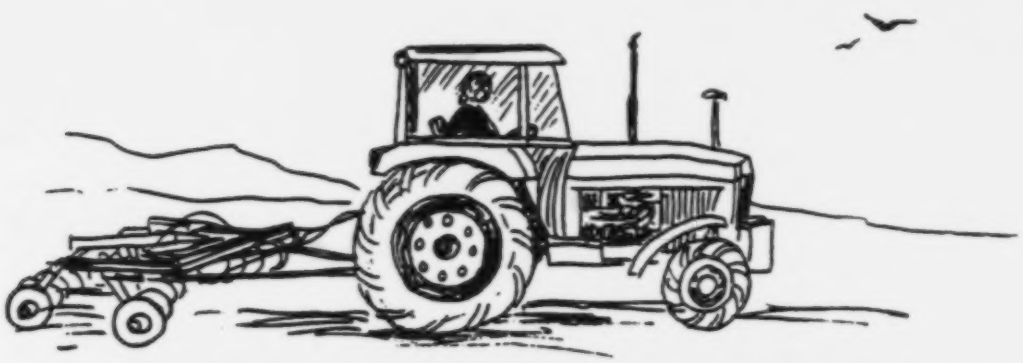
My family, the DeCooks, farms about 900 acres in central New York. We grow 400 acres of corn, 100 acres of wheat, 40 acres of oats, 120 acres of kidney beans, and 125 acres of hay. The rest of the land is woods, hedgerows, pastures, and a pond. We also raise about 50 beef animals. I have just graduated from high school with my brother Jeff. Jeff is going to college. I am working on the farm with my father and stepmother. When Jeff returns from college, we all plan to go into business together. Like everyone in agriculture, my life changes with the seasons. In the spring, we plant; summer and fall, we harvest; and in winter, we plow snow and repair equipment.

I am going to describe our farming activities month by month.

January - We feed the beef cattle in the morning and at night, and plow snow as needed.

February and March - We plow snow from people's driveways and the parking lots of businesses. We repair our field equipment.

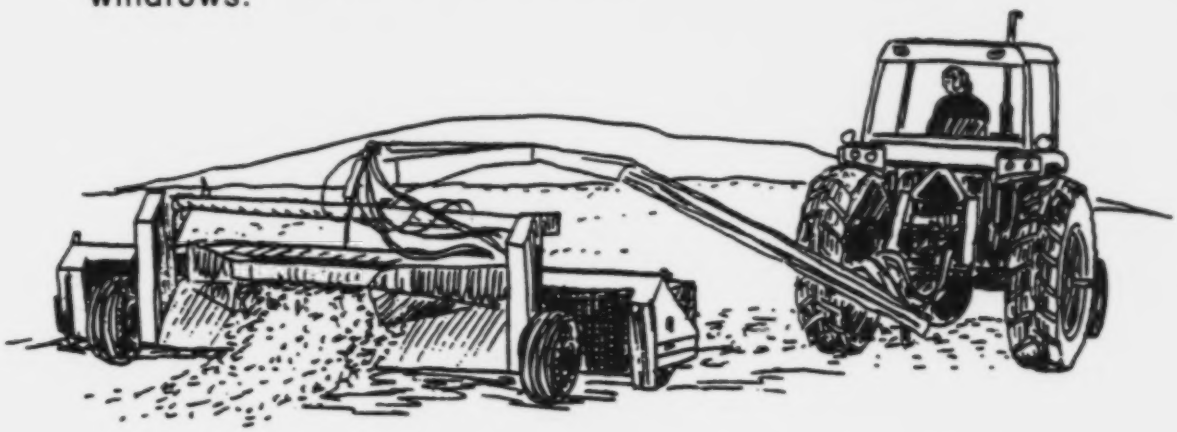
April - We plant oats and then corn. We have usually plowed



the soil in the fall so it is already done. In spring, we begin by disking. This breaks up the soil. Then we drag the field with a spring-toothed harrow. We call this piece of equipment a drag. And, if we need to, we then use a cultipacker. We usually only go over the field with each of these once, for corn. If the soil

is warm enough, we plant corn. The soil temperature has to be at least 50° F. If it is not, the seed will rot in the ground and we have to replant.

May - As soon as the crop is planted, we spray the fields with herbicides (weed killers). We fertilize at the same time that we plant. Planting the corn will take us right to the end of May. At the end of May we begin to make hay. Our hay is alfalfa, which is a very high quality hay. (I think that making hay is the worst job on a farm. But it doesn't last long!) First, we cut the hay and put it into rows. These rows are called windrows.

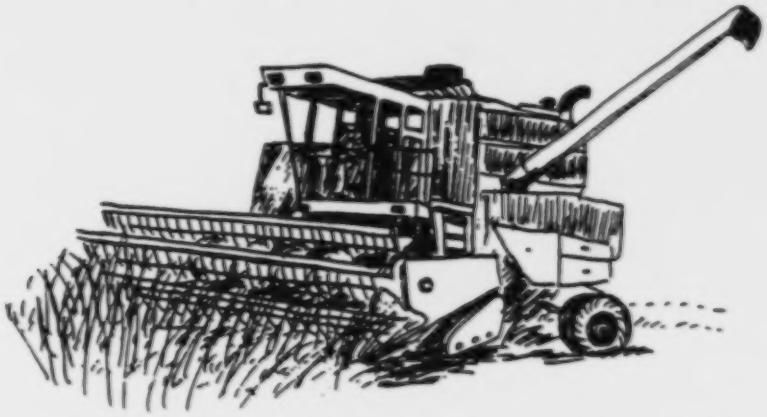


Two days later, if it doesn't rain, we rake the hay. This turns the hay over and helps the underside to dry. If it rains, we will have to let it dry longer. Then we will bale it that afternoon or the next day. It is important to dry the hay quickly and then get it out of the sun to keep it nutritious.

The bales of hay are loaded onto a wagon, stacked in the barn, and either fed to the cattle or sold later on.

June - We finish making hay in June. It takes about one month. We also plant beans. When we plant beans, the soil preparation is very important. The beans need to have very good contact with the soil. That means we have to work up the soil very well. We use the same equipment as with corn but we go over the field many times instead of just once. We adjust the corn planter to plant the bean seeds. We fertilize and apply herbicides at the same time. We also spread manure at this time.

July - Life slows down a bit in July. We go on vacation for a couple of weeks. When we get back it is time to harvest wheat.

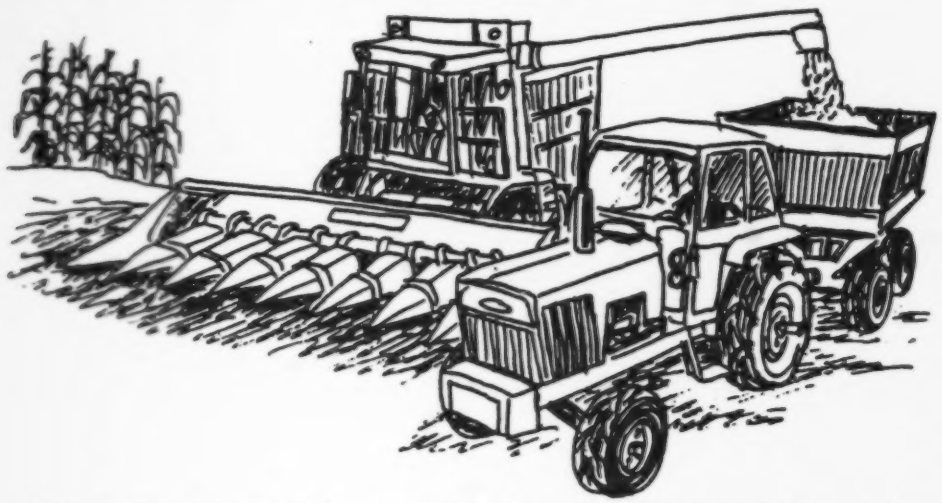


August - We combine wheat and oats. The combine cuts the grain off about six inches above the ground. It removes the grain from the stalk and puts it in a bin. The straw is blown out of the back into windrows. When the bin on the combine is full we empty it into a truck. Then we unload the truck into bins.

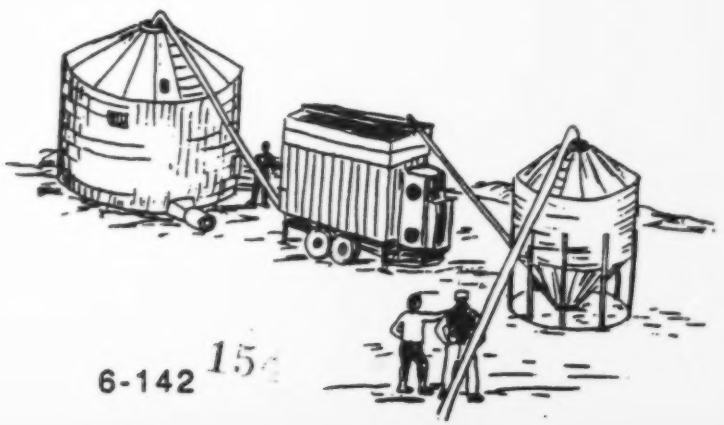
Next, we bale up the straw and put it in the barn. Then we do a second cutting of hay.

September - Bean harvest and planting wheat are the work for this month. First we pull the beans out of the soil. Then we put them into windrows and thresh them. We plant wheat after the 15th of the month. The soil is worked up and the wheat is planted with a grain drill. The fertilizer is broadcast all over the field. This means that it is spread all over the field.

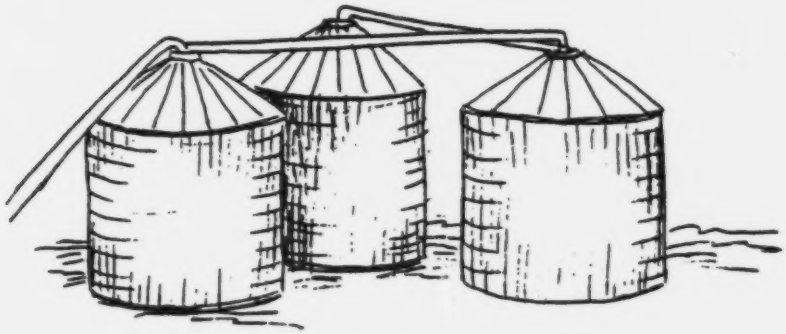
October and November - As soon as the corn is dry (25% moisture), we harvest the corn. We use the same combine as we used for wheat and oats, with a different attachment on the front. This is called a "corn head." The corn is pulled off of the stalk, the husks are removed from the ear and the kernels are taken off of the ear. The grain goes into a



bin. When the bin is full, we put it into a wagon and take it to the corn dryer. We dry the corn in our own natural gas dryer,



and then store it in bins. As soon as we get the corn



harvested, we do the fall plowing. We plow with a chisel plow as a conservation move.

December - We help other farmers combine their corn and begin maintenance on the equipment.

That is our year in a nutshell. We sell our crops to businesses all over the U.S. and in Mexico and Canada. Some of our crops are specially grown to become certified seed. Certified seed is carefully grown, cleaned and controlled so that it can be guaranteed.

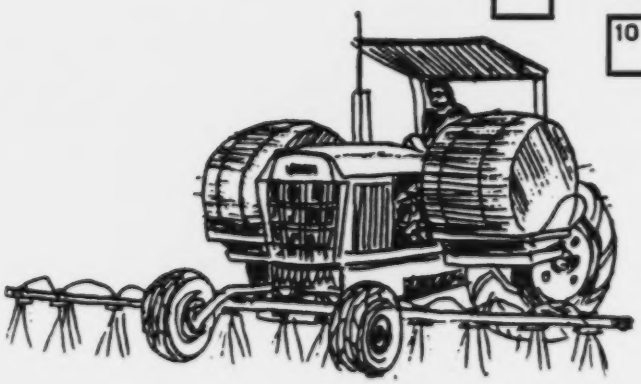
Some of our farm is hilly. Where we have steep hills we plant alfalfa. Keeping the soil covered with a hay crop prevents erosion. If the soil washes away, it takes millions of years to replace. We try to take good care of our resources so that we will have them as long as possible. One of our latest jobs was to tile a field. Tile is hollow pipe that is placed in the ground. The tile collects water and moves the water out of the field. By making the soil drain well, we make the farm more productive. We have to be as efficient as we can so that our business stays healthy.

Name_____Date_____

Three Family Farms

Directions: Use these words to complete this crossword puzzle:

CHISEL
CULTIPACKER
CULTIVATE
DISK
JULY
KIDNEY
SWEAT
THRESHER
WINTER-WHEAT
WINDROWING



Across

3. smashes soil lumps with its heavy steel wheels
4. _____ _____ is planted in the fall, goes dormant in the winter and regrows in the spring.

7. The Van Opdorps _____ to reduce the weed killers they use.

8. Pigs cannot _____ so they cool themselves by lying on cool soil.

10. type of beans the VanOpdorps plant

Down

1 In_____ , the DeCooks take a vacation.

2. Putting hay, straw or beans into rows is called_____.
5. machine used to separate the kidney beans from their pods
6. A _____ plow is used today rather than a mold-board plow to save soil.

9. equipment used after plowing

TEACHER MATERIALS

CONCEPTS:

Social Studies	- technology (geographic pages 96, 106)
	- change (political page 52) (geographic page 96) (historic pages 100, 104, 106)
	- environment (geographic pages 84, 88, 90, 92, 94, 96)
	- scarcity (geographic pages 88, 92)
	- citizenship (geographic page 94)
Life Science	- III A-1.1 III B-2
Ecosystems	- III E-2.11,2.12,2.13,3
Health	- nutrition
Reading	- for comprehension

BACKGROUND: Children rarely think about the importance of land or how a change in land use could affect them and the world. They can, with help, understand the connections between land, people, and land use. Therefore, the central theme of the booklets is that humans depend upon land for their well-being and that we can either use the land to our advantage or detriment.

OBJECTIVES and ACTIVITIES: See the following packets.

NOTE: The black ink on the covers of "The Dracons" rubs off. This was noted during piloting of this booklet. Although the ink was a problem, teachers gave the booklet a high rating. Therefore, it was decided to use it and warn teachers. The students will need to wash their black hands after reading the booklet. The Soil Conservation Society hopes to correct the problem in the future.

Name _____ Date _____

Vocabulary

Bacteria - _____

_____

Conservation - _____

_____

Contour farming - _____

_____

Cost sharing - _____

_____

Crop Rotation - _____

_____

Fertile - _____

_____

Irrigation - _____

_____

Furrow - _____

_____

Land leveling - _____

_____

Legumes - _____

_____

Runoff - _____

_____

Soil erosion - _____

_____

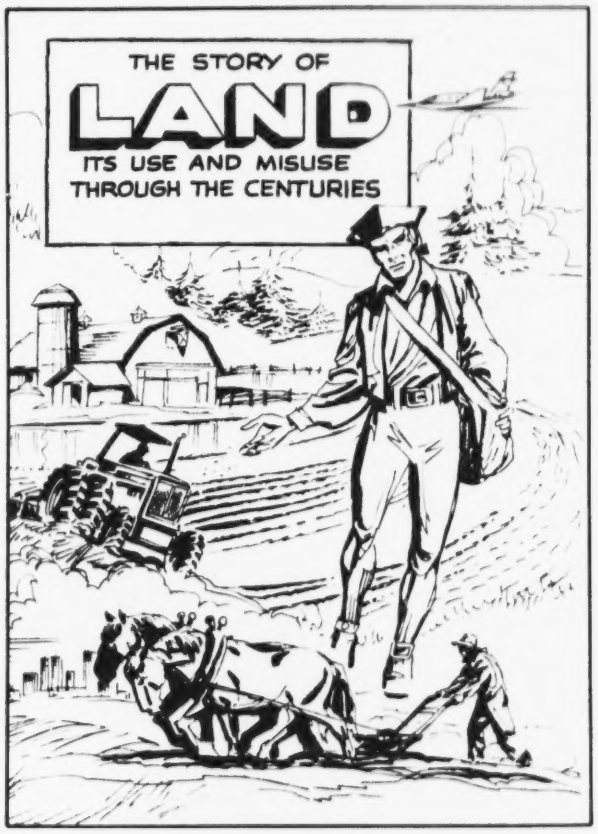
Terrace - _____

_____

Watershed - _____

_____

TEACHER'S GUIDE



TEACHING ABOUT LAND

Children rarely think about the importance of land and land use change to themselves and humankind generally. They can, with help, understand the connections between land, people, and land use. Therefore, the central theme of the booklet is that humans depend upon land for their well-being and that humans can use the land to their advantage or to their detriment.

CONCEPTS

1. Food, clothing, shelter, and recreation are products and services of the land.
2. How land is used determines how well and how long it can meet human needs.
3. Land and its use has dictated the fate of civilizations throughout history and will continue to do so.
4. Land conservation is everybody's business.

OBJECTIVES

These performance objectives are listed to help you evaluate your students. Each is keyed to a portion of the booklet or one of the activities herein that will help students meet the objective. Emphasize those that best meet your situation.

After completing their study of "The Story of Land..." students will be able to:

1. List five components of fertile soil. (p. 2 of booklet)
2. List five products that come from plants that grow in the soil. (p. 3)
3. Describe how three individuals influenced land use in the United States. (p. 6 and Other Things for Students to Do)
4. Describe two ways people change the natural landscape so the land can be used for a specific purpose. (p. 4-7 and Other Things for Students to Do)
5. Tell how weather and land uses in the 1930s influenced land use in later decades. (p. 7-8)
6. List three conservation practices farmers can use to reduce soil erosion on their land. (p. 9-10)
7. Describe two ways farmers can conserve irrigation water. (p. 11)
8. Explain how land use decisions are made. (p. 13-14 and Activity 1)
9. Propose actions they can take to affect land use locally, based on past and present resource conditions and management actions. (Activity 2)

TERMS TO KNOW

Terms important to the understanding of land and its use are defined below. Each term is referenced to where it first appears in the booklet. You might want to reproduce the list and give it to the students before they read the booklet. The students could develop crossword puzzles, anagrams, or other word puzzles using this list.

bacteria - microscopic organisms living in water and on land that help change dead plants and animals into soil nutrients. (Page 2 of booklet)

TERMS - continued

conservation(ist) - the protection, improvement, and use of natural resources to assure the greatest benefits for humans and the environment now and into the future. (p. 6)
conservation district - a public agency created to develop and carry out soil, water, and related resource conservation within its boundaries; usually a part of state government with a governing body at the county level. Also known as natural resource districts, and land conservation committees
conservation practice - a technique used to control soil erosion or conserve water. (p. 8)
contour farming - conducting farm operations across a slope rather than up- and down hill to control soil erosion. (p. 6)
cost-sharing - monetary assistance from government to help a landowner pay for installing conservation practices. (p. 14)
crop rotation - the growing of different crops in alternate years on the same land. (p. 6)
drain(ed) - to remove unwanted water from land, usually by using ditches or underground pipes. (p. 7)
fertile - refers to the condition of soil containing adequate amounts of nutrients in proper balance for the growth of desired plants. (p. 2)
grassed waterway - a shallow, grass-covered ditch that allows surface water to flow off cropland without causing soil erosion. (p. 10)
grassland (prairie) - level to hilly land with mostly grasses and forbes, few shrubs, and no trees. (p. 7)
grazing methods - controlling consumption of vegetation by cows and sheep so the land is not harmed. (p. 12)
irrigation - putting water on agricultural land to help crops grow. (p. 3)
irrigation, contour furrow - applying water to crops in rows that run across the slope to lessen soil erosion and conserve water. (p. 11)
irrigation, drip - allowing water to drip from pipes on or below the surface of the ground to the root area of plants. (p. 11)
land - all natural resources in their natural state and position, such as mineral deposits, wildlife, timber, fish, water, coal, and the fertility of the soil. (p. 3)
land leveling - making the land surface flatter to evenly distribute and slow the movement of water over the land. (p. 11)
legumes - plants such as peas, beans, peanuts, clovers, alfalfas, and lespedezas that take nitrogen from the air and change it so it becomes a soil nutrient. (p. 6)
runoff - rain or snowmelt that does not soak into the soil but rather "runs off" land often carrying eroded soil with it. (p. 10)
soil - a naturally occuring mixture of minerals, organic matter, water, and air which has a definite structure and composition, forms on the surface of the land, and serves as a natural medium for the growth of land plants. (p. 2)
soil building and protecting crops - plants of agricultural value that improve the fertility of soil and protect it from erosion. (p. 11)
soil erosion - movement of soil by wind or water. (p. 4)
terrace - an embankment constructed across a slope to control erosion by slowing runoff. (p. 4)
watershed - all the land from which water drains into a single stream. (p. 10)

ACTIVITY 1: A CONSERVATION HEARING

Laws are an important tool in resource management at all levels of government. Such laws are established by elected officials as a result of concerns expressed by the people the elected officials represent. Concerns are often expressed through public hearings. The following activity will give students an idea of what public hearings are like and also give them a chance to make value judgments based on their understanding of resource management and testimony presented at the hearing. They will discover that there are at least two sides to most questions and that there are seldom easy answers to land use issues.

Let Us Know What You Think

We want to know what you think about the educational cartoon booklet and teacher's guide you have received. Please complete this short evaluation form and return it to us. We want to make sure that we provide educators with materials that are educationally sound, interesting to children, and practical. Your response will help us to continue to do so. Feel free to give us a call at (515) 289-2331. We welcome the opportunity to discuss your ideas with you.

Please return this form to: Soil & Water Conservation Society
7515 N.E. Ankeny Road
Ankeny, Iowa 50021-9764

General

Your Name: _____

Grade(s) or age level(s) and subject(s) in which the materials were used: _____

School or organization name: _____

Address: _____

City/state or province/zip or postal code: _____

1. Did the lesson, as you presented it, take too much time? _____
2. Circle one of the following that best describes your use of the materials.

   As a basis for a unit To supplement a regular unit

   Other (describe): _____

   _____
3. Do you plan to use the materials again? _____

Cartoon Booklet

4. Show title of booklet used _____
5. Circle the answer which best describes your opinion of the booklet's reading level.

   Too high About right Too low
6. Circle the answer which best describes your opinion of the story.

   Interesting Too comical Too dull
7. Circle the answer that best describes your opinion of the booklet.

   Too long Too short About right
8. Circle the answer that best describes your opinion of the booklet.

   Excellent Very good Good Fair Poor
9. The booklet could be improved by: _____

   _____

(over)

Teacher's Guide

10. Was enough background information presented to familiarize yourself with subject matter? _____

11. Circle the answer that best describes your opinion of the teacher's guide.

    Excellent Very good Good Fair Poor

12. The teacher's guide could be improved by: _____

    _____

    _____

13. Would you field test SWCS's educational materials in the future? _____

14. Who purchased the materials for your use, if other than your school or organization?

    Name: _____

    Address: _____

    City/state or province/zip or postal code: _____

15. Please describe environmental education materials you would like to see developed for your use.

    (Use additional paper if needed.) _____

    _____

    _____

16. If you know others who might appreciate receiving information about SWCS's educational cartoon booklets, indicate their names and addresses below.

    Name: _____

    Address: _____

    City/state or province/zip or postal code: _____

    Name: _____

    Address: _____

    City/state or province/zip or postal code: _____

    Name: _____

    Address: _____

    City/state or province/zip or postal code: _____

    Name: _____

    Address: _____

    City/state or province/zip or postal code: _____

Please return this form to SWCS, 7515 N.E. Ankeny Road, Ankeny, Iowa 50021-9764

ACTIVITY 1 - continued

Your students will conduct a conservation hearing about a specific land use proposal. Select one of the following proposals for discussion at the conservation hearing (you may want to develop others more pertinent to your local community):

1. Drain a wetland so that a new highway can be built through the area.
2. Halt farmers from planting row crops (corn, soybeans, cotton, sorghum) on their steeply sloping land.
3. Clear native trees and shrubs to establish grassland for livestock.
4. Dam a river to make a reservoir.
5. Build a parking lot on the site of a city park.
6. Stop all hunting and trapping of wildlife on public lands.

Ask the students to research these questions about the land use idea:

1. Will the new land use change the environment? In what ways?
2. Will humans benefit from or be harmed by the land use? In what ways?
3. Do you think the idea is a good one? Be ready to explain your opinion at the conservation hearing.

After the students have researched the land use idea, ask three or five to serve on a conservation committee to listen to the other students' opinions. The committee will decide whether the idea should be approved.

One of the students on the committee should serve as chairman to control discussion. Each student is allowed only one chance to express his or her opinion to the committee. Only the committee members are allowed to ask the students questions.

The committee should openly discuss the opinions presented and decide in favor of or in opposition to the land use idea, or if need be, develop a compromise land use idea.

A Step Further: Have each student write a brief opinion of the idea and present it to the committee chairman before the committee's decision is announced. The chairman can then announce the committee's decision and read the students' opinions. Did the committee accurately represent the views of the class?

ACTIVITY 2: HISTORY FOR THE FUTURE

If students appreciate the history of resource conservation and those who shaped it, they will better understand what is now going on in their own communities and how human action, or the lack of it, will affect the future of that community. This activity is designed to help students realize that each new event has a cause and exercises a future effect--that events have three dimensions--THEN (cause), NOW (action or lack of), and TOMORROW (effect).

Fixing the NOW Dimension

Ask the students to list land use activities now taking place in the community. The list may include items like new highway construction, park development, housing development, business construction, urban revitalization, surface mining, logging, and others.

Help the students reduce the list to a few key activities. Have groups of four to six students select one of the activities and then determine what that activity is doing to the environment now. For example, if a new store is being built in a wooded area, trees may be killed, thereby destroying shelter and food for animals; soil may be being dug up or paved over, etc. Students can monitor the changes in the environment that take place at the activity for a short period of time or talk to people to find out what changes have taken place recently, like a mayor, forester, owner of the property, health department sanitarian, and others.

Establishing the THEN Dimension

Ask the students to determine what caused the land use activity they've been studying. For example, some reasons or causes for the construction of a new sewage disposal system might be that the community's population increased so much the old one couldn't handle the increased load. Or, because the old system was malfunctioning, causing pollution of the local swimming beach and the death of fish, the community decided to build the new one. Sources of THEN information will include the library, historical society, cemetery records, museum director, "old-timers," historical museum, local newspaper, etc.

ACTIVITY 2 - continued

The TOMORROW

Help the students consider alternative courses of action to the land use activity they've studied based on information they've gathered. Help them understand how THEN and NOW information relates to TOMORROW. Ask the students to identify things they can do to further good land use in the community.

OTHER THINGS FOR STUDENTS TO DO

* Illustrate changes in the land on which your community is located from before it was settled, through time, to how it appears today. Draw a poster; construct a model; write a report, a song, or poem. Check with your local library or school library, the historical society, or talk with some "old-timers." You might also determine why your community developed where it did.

* Research two or more of the following individuals to find how they influenced land use decisions. People from many walks of life influence land use decisions in important ways.

  Ansel Adams, photographer (1902-1984)
  John J. Audubon, painter (1785-1851)
  Hugh Hammond Bennett, soil conservationist/administrator (1881-1960)
  Rachel Carson, biologist/author (1907-1964)
  George Washington Carver, agricultural scientist (1864-1943)
  Jay N. "Ding" Darling, cartoonist/administrator (1876-1962)
  Aldo Leopold, wildlife manager; educator (1886-1948)
  John Muir, geologist/author/administrator (1838-1914)
  Gifford Pinchot, forester/administrator (1865-1946)
  Theodore Roosevelt, U.S. president (1858-1919)
  Henry David Thoreau, naturalist/author (1817-1862)

WHERE TO GET MORE INFORMATION

The Soil Conservation Service, Extension Service, and Forest Service of the U.S. Department of Agriculture, and the Bureau of Land Management, Fish and Wildlife Service, and National Park Service of the U.S. Department of the Interior are among the federal agencies in the United States that can assist in your discussions of land use. These agencies have either regional, state, or local offices. Telephone directories list these offices under "United States Government."

State and local agencies, such as Departments of Natural Resources, Game and Fish Commissions, Conservation Commissions, Conservation Districts, or Natural Resource Districts, can also be of assistance to you. Telephone directories list these offices under the name of your state, county, or city.

Environment Canada is the Canadian federal agency that can provide the greatest assistance to you, particularly the Lands Directorate, which has regional offices. Provincial and local agencies, such as Departments or Ministries of Natural Resources and Conservation Authorities can also help.

Educational Resources Information Center (ERIC) is a national information retrieval system for education resources on a variety of topics. Write ERIC, Science, Mathematics, and Environmental Education, The Ohio State University, 1200 Chambers Road, Room 310, Columbus, Ohio 43212.

The Conservation Directory, published annually by the National Wildlife Federation, lists many conservation agencies and organizations in the United States and Canada that can help. Your public library can help, too.

* *
* For a free brochure describing *
* SCSA's other educational cartoon *
* booklets, write: Soil Conservation *
* Society of America, 7515 N.E. *
* Ankeny Road, Ankeny, Iowa *
* 50021-9764, or call (515)289-2331. *
* *

DRACONS
VISIT
EARTH
To Study Food And The Land!

INTRODUCTION

Land is an essential element for food production. It includes the minerals, wildlife, plant life, water, and soil. Land is a country's most valuable natural asset. Canada and the United States are food production leaders due, in part, to the abundance of productive land within their borders.

Food is a direct product of the land. The larger and more productive the land resource base, the more food a nation can produce. Thus, any action that removes land from production or degrades soil affects the food supply.

Population growth, soil erosion, and conversion of farmland to other uses strain a nation's food supply. Land conservation efforts help offset these inevitable strains and, at the same time, provide an important edge in planning for the future. We should accept our responsibilities, as stewards of the land, to do what we can to help maintain food production potential.

These materials help teach students in grades 4-6 about land and food production. Included are cartoon booklets for each student, **Dracons Visit Earth: To Study Food and the Land;** four activity masters; and this file folder/teacher's guide.

Begin your lesson on food and the land by asking your students to read the cartoon booklet. Then follow with the four activities on the masters.

Activity 1:

WHAT'S YOUR OPINION?

Objectives:

Students (1) identify stresses to the food supply and (2) investigate the role of stewardship through a public opinion survey.

Background Information:

Good journalists like Ed Itor know that getting the facts and putting them in perspective is the only way to research a story. Through observations, interviews, and personal experiences, he discovered what he needed to know in order to write an accurate account of food production.

The first activity encourages students to get involved in the stewardship of the land in their communities. As investigative reporters, they launch a fact-finding mission of their own, observing and interviewing people they know.

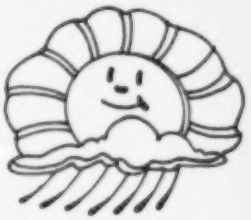
Methods:

Ask the students to interview two persons other than the members of their immediate families using the activity sheet. Subjects can complete the first part of the survey themselves. Students will have to use separate sheets of paper to record answers for the second part.

After gathering data, students can work in small groups to write a short report summarizing the opinions of the people they interviewed. Remind them to use direct quotations whenever possible and to paraphrase as clearly and as accurately as they can. Have each group present its report to the class. List findings on the chalkboard. Have the students analyze the responses to discover trends in the data. (For example: Maybe all people who live in cities think there will be food shortages or perhaps people who belong to farm organizations think each person can do more to conserve soil and water.)

Activity 2:

FOOD PRODUCTION SCALE



Objectives:

Students (1) are introduced to the six factors that determine food production potential and (2) investigate the relationship each has to food production.

Background Information:

Fifty years ago the average farmer produced enough food for 11 people; today that figure is 78. What caused this phenomenal growth? The most direct answer is beneficial agricultural research, which has improved seed varieties, pesticides, fertilizers, and farming implements. Farming has changed over the years from the trial-and-error system of individual farmers. Today it is a complex industry involving research, education, marketing, manufacturing, financial management, transportation, and a whole lot more. And each of these influence the individual farmer.

But food production still depends mainly upon the interaction of six factors: soil, water, climate, plants, animals, and human influence.

Soil is the medium for plant growth on the land. It provides plants with the nutrients and water they need to grow. Soil must be conserved to maintain food production levels.

Water is a basic requirement for plants and animals. Having too much or too little water, or poor quality water, will reduce food production.

Climate influences the temperature and amount of moisture available to a plant or animal. Farmers must select crops and animals that are compatible with the local climate.

Plants can be made more vigorous by research. Scientists are continually developing improved seeds, through hybridization and other techniques, which can be grown in wider variety of climates and still maintain high yields.

Let Us Know What You Think

Dear Teacher:

We want to know what you think about the educational cartoon booklet "Dracons Visit Earth ..." and this teacher's guide. Please complete this short evaluation form and return it to us. We want to make sure that we provide educators with materials that are educationally sound, interesting to children, and practical. Your response will help us to continue to do so.

We will send a brochure describing all of our educational cartoon booklets and teacher's guides, and costs.

Thank you!

Soil Conservation Society of America
7515 N.E. Ankeny Road
Ankeny, IA 50021-9764

P.S. Please feel free to give us a call at (515) 289-2331. We welcome the opportunity to discuss your ideas with you.

General

Name _____

Grade(s) and subject(s) you teach _____

Grade(s) and subject(s) in which the materials were used _____

School name _____

Address _____

City/State or Province/Zip or Postal Code _____

1. Did the lesson, as you presented it, take too much class time? _____
2. Circle one of the following that best describes your use of the materials:

   As a basis for a unit To supplement a regular unit

   Other (describe) _____
3. Do you plan to use the materials again? _____

Cartoon booklet

4. Circle the answer which best describes your opinion of the booklet's reading level.

   Too high About right Too low
5. Circle the answer which best describes your opinion of the story.

   Interesting Too comical Too dull
6. Circle the answer which best describes your opinion about the length of the booklet.

   Too long Too short About right
7. Circle the answer that best describes your opinion of the booklet.

   Excellent Very good Good Fair Poor

- over -

8. The booklet could be improved by: _____

_____

Teacher's Guide

9. Was enough background information presented to familiarize yourself with subject matter? _____

10. Were the instuctions for each activity master clear? _____

If not, please circle the activity number(s) for which instructions should be improved

1 2 3 4

11. Circle the activity master(s) number(s) that you used. 1 2 3 4 None

If you did not use them all, please indicate why not. _____

_____

12. Circle the answer that best describes your opinion of the teacher's guide.

Excellent Very good Good Fair Poor

13. The teacher's guide could be improved by: _____

_____

_____

14. Might you be willing to field test environmental education materials that SCSA develops in the future? _____

15. Who purchased the materials for your use, if other than your school?

Name _____

Address _____

City/State or Province/Zip or Postal Code _____

16. Please describe environmental education materials you would like to see developed for your use.

(Use additional paper if needed.) _____

_____

_____

17. If you know someone else who will appreciate receiving information about SCSA's educational cartoon booklets, indicate the individual's name and address below.

Name _____

Address _____

City/State or Province/Zip or Postal Code _____

_____

Please return this form to: Soil Conservation Society of America
7515 N.E. Ankeny Road
Ankeny, IA 50021-9764

Activity 1:

WHAT'S YOUR OPINION?

Interview 1

Name _____

Age _____ Sex: ☐ M ☐ F

Place of residence:

☐ city ☐ suburb ☐ town ☐ rural

Have you ever lived on a farm?

☐ Yes ☐ No

Have you ever worked on a farm?

☐ Yes ☐ No

Have you ever visited a farm?

☐ Yes ☐ No

To which of the following agricultural or natural resource organizations have you belonged?

_____ 4H

_____ Future Farmers of America

_____ National Farmers Union

_____ American Farm Bureau Federation

_____ National Wildlife Federation

_____ Other _____

_____ None

Do you grow any of your food?

☐ Yes ☐ No

About what percentage of your budget do you spend on food?

_____

Interview 2

Name _____

Age _____ Sex: ☐ M ☐ F

Place of residence:

☐ city ☐ suburb ☐ town ☐ rural

Have you ever lived on a farm?

☐ Yes ☐ No

Have you ever worked on a farm?

☐ Yes ☐ No

Have you ever visited a farm?

☐ Yes ☐ No

To which of the following agricultural or natural resource organizations have you belonged?

_____ 4H

_____ Future Farmers of America

_____ National Farmers Union

_____ American Farm Bureau Federation

_____ National Wildlife Federation

_____ Other _____

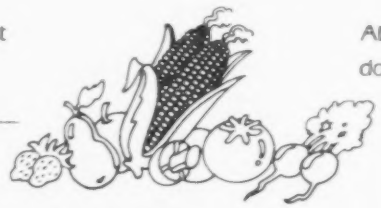
_____ None

Do you grow any of your food?

☐ Yes ☐ No

About what percentage of your budget do you spend on food?

_____

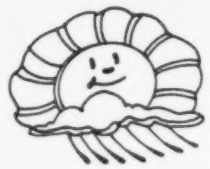


Interview questions (write the answers on another piece of paper):

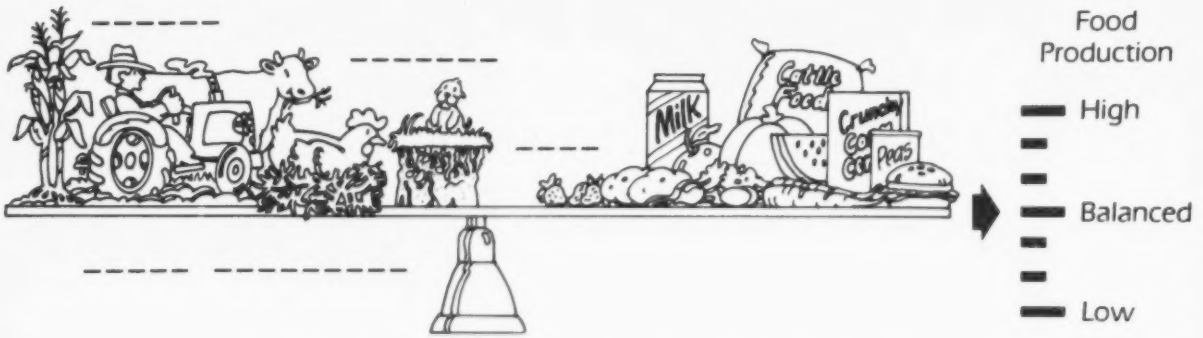
1. Are there any major food shortages in the world today? If so, where?
2. Do you think there will be food shortages in the next 10 years? If so, where?
3. Do you think food prices are too high? If so, who is to blame?
4. Should our country allow its best farmland to be converted to other uses such as housing, industrial development, roads, and the like? Why?
5. Should our country continue to offer scientific help to developing nations? Why?
6. Do you think soil and water conservation efforts now can help avoid a food crisis later?
7. What role do you think you should play in soil and water conservation efforts?
8. What would you say is the most critical decision that farmers will face in the next 5 to 10 years?

Activity 2:

FOOD PRODUCTION SCALE



Six factors that influence how much food a farmer can produce are: plants, soil, animals, climate, water, and human influence. Write these factors on the lines of the food production scale.



The food production scale is now balanced. When balanced, a farmer can harvest a certain amount of food from a given amount of land. If any of the six factors change, the food production scale changes. If any of the factors change favorably — food production will be higher. The farmer will be able to grow more food on the land. But, if a factor changes unfavorably the farmer will grow less food — food production will be lower.

The following sentences each contain a blank. Read each sentence and fill in the blank by writing the word "higher" or the word "lower." Each statement refers to one of the six factors. Write the name of the factor you think relates to the statement in the space in front of the sentence.

_____ 1. Food production can become _____ if farmers do not conserve soil.

_____ 2. If it doesn't rain on a field of corn for six weeks, food production from this field will probably be _____.

_____ 3. If corn seed is developed that will produce more ears per plant, this may help production to be _____.

_____ 4. If the soil becomes badly eroded, food production could be _____.

_____ 5. If cattle are developed that will grow better than usual on poorer quality feed, food production could be _____.

_____ 6. If Florida has a warmer than normal winter in its orange growing region. Orange production will probably be _____.

Discussion Questions:

1. Which of the six factors do you think limits food production in your area the most? Why?
2. Over which of the six factors do you think farmers have the least control? The most control? Why?

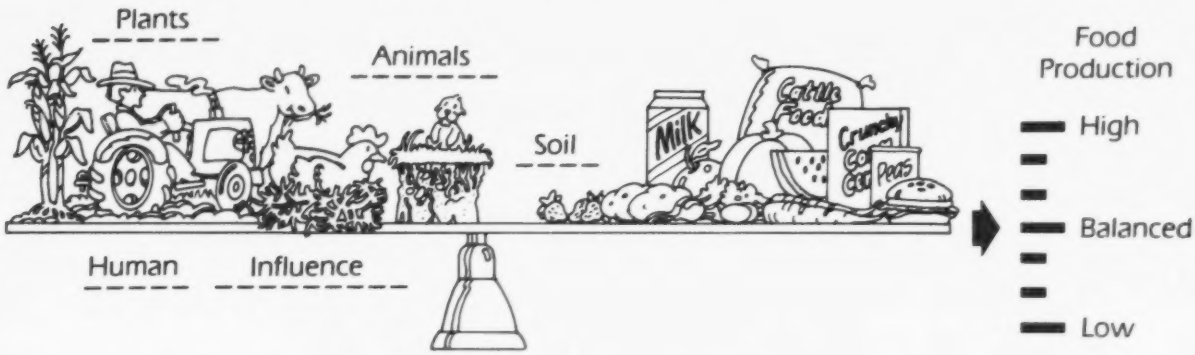
Activity 2:

FOOD PRODUCTION SCALE

Climate _____

Water _____

Six factors that influence how much food a farmer can produce are: plants, soil, animals, climate, water, and human influence. Write these factors on the lines of the food production scale.



The food production scale is now balanced. When balanced, a farmer can harvest a certain amount of food from a given amount of land. If any of the six factors change, the food production scale changes. If any of the factors change favorably — food production will be higher. The farmer will be able to grow more food on the land. But, if a factor changes unfavorably the farmer will grow less food — food production will be lower.

The following sentences each contain a blank. Read each sentence and fill in the blank by writing the word "higher" or the word "lower." Each statement refers to one of the six factors. Write the name of the factor you think relates to the statement in the space in front of the sentence.

(Human influence)

(Water)

(Plants)

(Soil)

(Animals)

(Climate)

1. Food production can become (lower) if farmers do not conserve soil.
2. If it doesn't rain on a field of corn for six weeks, food production from this field will probably be (lower).
3. If corn seed is developed that will produce more ears per plant, this may help production to be (higher).
4. If the soil becomes badly eroded, food production could be (lower).
5. If cattle are developed that will grow better than usual on poorer quality feed, food production could be (higher).
6. If Florida has a warmer than normal winter in its orange growing region. Orange production will probably be (higher).

Discussion Questions:

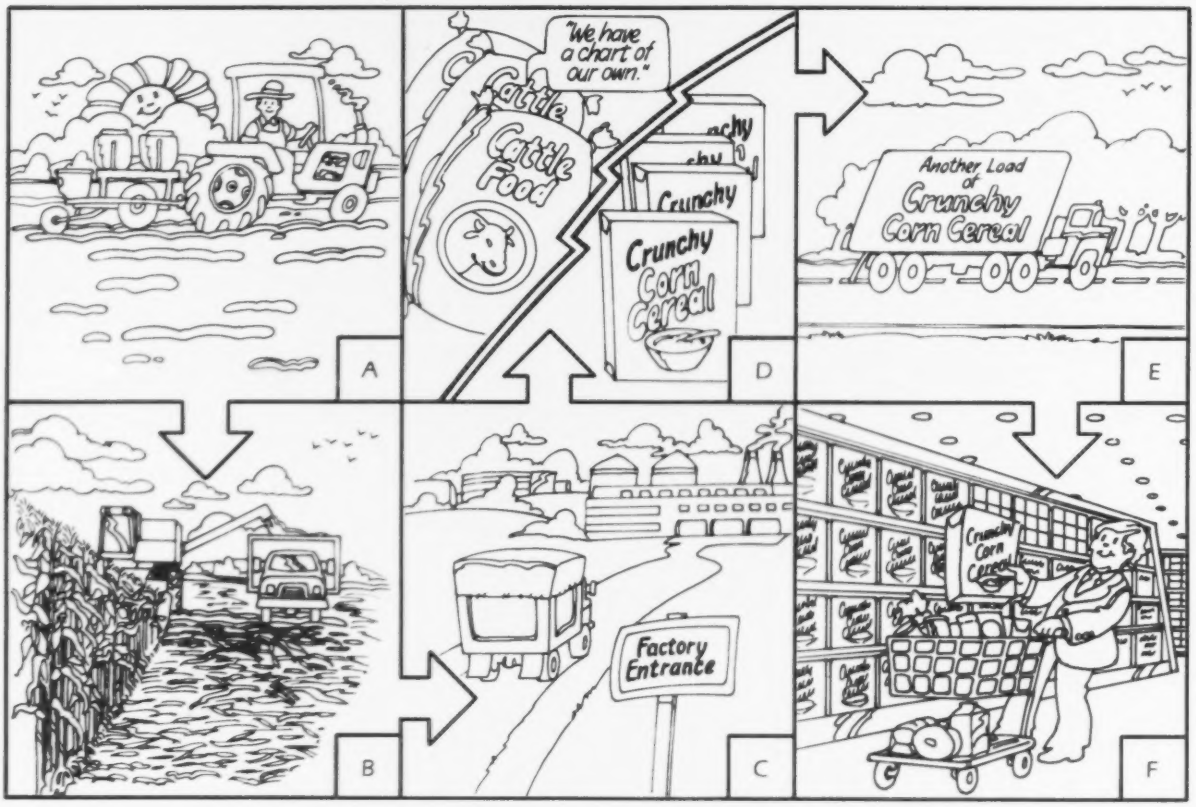
1. Which of the six factors do you think limits food production in your area the most? Why?
2. Over which of the six factors do you think farmers have the least control? The most control? Why?

Activity 3:

FOODPATHS

These pictures show the path that Scoop took after the corn harvester got hold of him. Below the pictures are descriptions of each step. The pictures are in order if you follow the arrows. But the descriptions are all mixed up. See if you can put things in order again. Match the picture with the description. Then place the letter of the picture in the small box by each of the descriptions.

CORN: From the Farm to Our Tables



☐ 1. Cereal is shipped to large distribution centers. Later it travels on to a supermarket.

☐ 2. The farmer begins the cycle by planting corn seeds.

☐ 3. The corn is processed at a factory. One type of factory may make cattle feed. Another factory can make cereal. Still other factories make different foods from corn.

☐ 4. Cereal is bought at the supermarket.

☐ 5. After the seeds have grown into mature plants, the farmer harvests the crop. Residue from the stalks is left behind on the soil to protect and enrich it.

☐ 6. After processing, the cattle feed is often put in sacks and sold to farmers. Cereal is put in boxes.

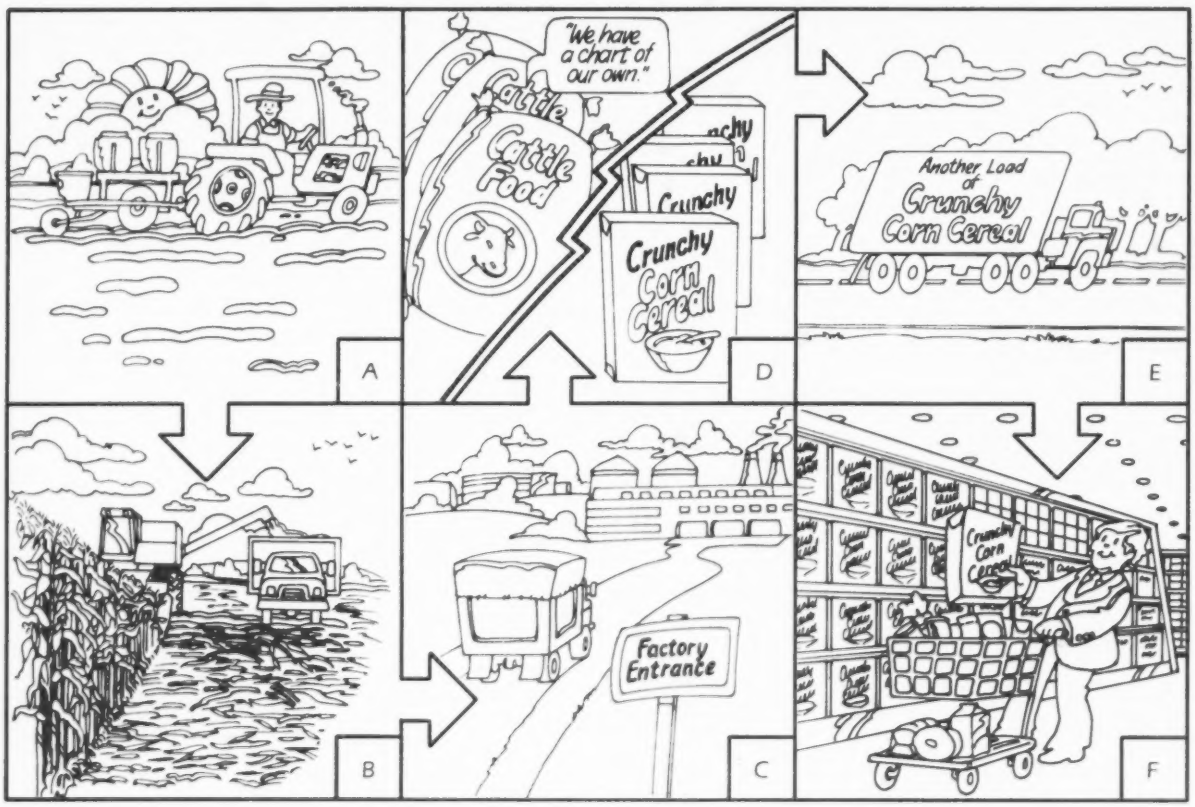
The sacks of cattle feed in picture D say that "we have a chart of our own." Find out the steps involved in raising cattle and getting beef to your home. Diagram them on the back of this activity sheet.

Activity 3:

FOODPATHS

These pictures show the path that Scoop took after the corn harvester got hold of him. Below the pictures are descriptions of each step. The pictures are in order if you follow the arrows. But the descriptions are all mixed up. See if you can put things in order again. Match the picture with the description. Then place the letter of the picture in the small box by each of the descriptions.

CORN: From the Farm to Our Tables



[E] 1. Cereal is shipped to large distribution centers. Later it travels on to a supermarket.

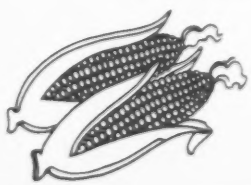
[A] 2. The farmer begins the cycle by planting corn seeds.

[C] 3. The corn is processed at a factory. One type of factory may make cattle feed. Another factory can make cereal. Still other factories make different foods from corn.

[F] 4. Cereal is bought at the supermarket.

[B] 5. After the seeds have grown into mature plants, the farmer harvests the crop. Residue from the stalks is left behind on the soil to protect and enrich it.

[D] 6. After processing, the cattle feed is often put in sacks and sold to farmers. Cereal is put in boxes.



The sacks of cattle feed in picture D say that "we have a chart of our own." Find out the steps involved in raising cattle and getting beef to your home. Diagram them on the back of this activity sheet.

Activity 4:

FOOD AND THE LAND

How much have you learned from our study of food and the land?
Read the following statements, and decide whether they are FACT or FICTION.

1. Most food is produced in factories.
   Fact Fiction

2. Agriculture employs more people in our nation than any other industry.
   Fact Fiction

3. People started farming around 1,000 B.C.
   Fact Fiction

4. The amount of food that can be produced from a given area of land depends on five main factors: water, climate, plants, animals, and humans.
   Fact Fiction

5. Erosion of topsoil is a serious threat to food production.
   Fact Fiction

6. Soil erosion has never been a serious problem.
   Fact Fiction

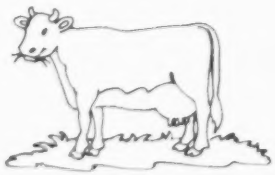
7. Many ways of preventing soil erosion also help make more water available to food crops.
   Fact Fiction

8. Soil erosion only occurs on farmland.
   Fact Fiction

9. The amount of food we eat is more important to our health than the kinds of food we eat.
   Fact Fiction

10. All countries can produce enough of the right kinds of food to help keep their people healthy.
    Fact Fiction

Based on what you've learned about food and the land, decide whether you agree or disagree with the following statements. Be prepared to explain your decision in class.



1. "We produce more food than we eat in our country now even though soil is eroding, so there's no need to control soil erosion."
   Agree Disagree

2. "We should give more food to countries with food shortages."
   Agree Disagree

3. "Farms are a waste of land. Many houses, new roads, and more stores could be built on that land."
   Agree Disagree

4. "My family can't do anything to help prevent soil erosion."
   Agree Disagree

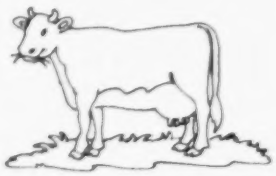
Activity 4:

FOOD AND THE LAND

How much have you learned from our study of food and the land?
Read the following statements, and decide whether they are FACT or FICTION.

1. Most food is produced in factories.
   Fact (Fiction)
   (Most food is a product of the land. Much of it is **processed** in factories.)
2. Agriculture employs more people in our nation than any other industry.
   (Fact) Fiction
   (The agricultural system includes: farming and ranching; producing and selling fertilizers, pesticides, farm machinery, seeds, and livestock; processing, transporting, and selling food; and others. However, relatively few people are farmers and ranchers.)
3. People started farming around 1,000 B.C.
   Fact (Fiction)
   (People discovered how to grow their own food about 11,000 years ago [9,000 B.C.].)
4. The amount of food that can be produced from a given area of land depends on five main factors: water, climate, plants, animals, and humans.
   Fact (Fiction)
   (Six factors. Soil is the medium in which all land plants grow.)
5. Erosion of topsoil is a serious threat to food production.
   (Fact) Fiction
   (Topsoil contains the nutrients and water crops need to grow well. Subsoil is much less productive, if productive at all. Topsoil forms naturally at the rate of about one inch per 1,000 years.)
6. Soil erosion has never been a serious problem.
   Fact (Fiction)
   (Erosion contributed to the destruction of ancient cities in Syria, Iraq, Lebanon, and much of northern Africa. Food supplies were reduced. Population declined because people moved to more fertile land or died because of malnutrition. The dust bowls of the 1930s reduced food production dramatically. Many experts claim that soil erosion is worse today than in the 1930s.)
7. Many ways of preventing soil erosion also help make more water available to food crops.
   (Fact) Fiction
   (Conservation tillage, contour farming, and other soil conservation practices slow water movement, allowing more of it to soak into the soil rather than run off fields.)
8. Soil erosion only occurs on farmland.
   Fact (Fiction)
   (Erosion can occur wherever there is soil. City parks, lawns, gardens, roadsides, forests, construction sites, shorelines, etc. are susceptible.)
9. The amount of food we eat is more important to our health than the kinds of food we eat.
   Fact (Fiction)
   (The amounts and the kinds of food we eat are equally important. Note the number of recommended servings of each of the four food groups as described in the booklet.)
10. All countries can produce enough of the right kinds of food to help keep their people healthy.
    Fact (Fiction)
    (Some countries do not have natural resources needed to meet their people's food needs. Some have climates that are unfavorable for food production.)

Based on what you've learned about food and the land, decide whether you agree or disagree with the following statements. Be prepared to explain your decision in class.



1. "We produce more food than we eat in our country now even though soil is eroding, so there's no need to control soil erosion."
   Agree Disagree
   (Reason: Research shows that in the long term, soil erosion will reduce food production even if better farming methods are developed.)
2. "We should give more food to countries with food shortages."
   Agree Disagree
   (Reason: Many people feel that we have a humanitarian obligation to help other countries solve food shortages. Helping them to become self-sufficient may be the best long term solution.)
3. "Farms are a waste of land. Many houses, new roads, and more stores could be built on that land."
   Agree Disagree
   (Reason: Loss of farmland to irreversible uses, such as roads, housing developments, parking lots, airports, etc., is a threat to future food production.)
4. "My family can't do anything to help prevent soil erosion."
   Agree Disagree
   (Reason: Everyone can help protect the land. Examples include: supporting conservation through tax monies, being less wasteful with food, reducing soil erosion around homes, being less wasteful with water, not building new houses on good farmland, and producing more food at home.)

Animals can be selectively bred to remove undesirable traits and thereby improve the efficiency of production and the quality of food derived from them.

Human influence is the positive or negative effect farmers have on food production. They influence production by the farming and conservation practices used. Their decisions are made in response to market demands, production costs, and government policies and rules.

Methods:

Begin this activity by writing the names of the six factors above on the chalkboard. Ask students to examine the booklet to find where each factor is referred to. Then discuss each factor mentioning the facts listed above. Students should understand that all factors have impacts on the amount of food that is produced in a given location.

Hand out the activity sheet and ask students to read and complete it. Then ask for volunteers to answer each statement. Students may want to write personal statements on the back of the activity sheet. Conclude the lesson by asking your students why farming can never be an exact science. Discuss their replies.

Additional Activities:

1. Students could research difficulties related to the six factors that farmers have faced and describe how farmers dealt with them.
2. Arrange a visit to a conservation farm in your area.

Activity 3:

FOODPATHS

Objective:

Students discover the links in the food production chain, tracing the journey of a single food item from production to processing to distribution.

Background Information:

On the average, each American and Canadian citizen consumes just under 1,400 pounds of food per year. Much of this food comes from plants and animals raised under the care of humans. Some foods are grown without human care and are harvested directly from nature.

It is easy for young people to assume, mistakenly, that food is a product of industry because we buy most of our food at a store. But food is a product of the land. The harvest, either plant or animal material, is transported, and then processed in a factory often many miles from the farmer's field. The food is shipped from the factory and eventually to a supermarket. Then we buy the food many miles from the processor and many more miles from the field.

In **Dracons Visit Earth**, Scoop, disguised as a corn plant, is harvested and carried along food production paths. His adventure shows that crops, like corn, can either be processed to be eaten by people, or they can be fed to animals, such as cattle. In the latter case, corn takes a different path to our dinner table.

Methods:

Ask your students where their food comes from. Use this question as a basis for describing the food production system from the field to the dinner table. You may want to draw a simplified diagram on the board using appropriate diagrams and these words: farmer's field, transport, processing, and supermarket.

In this activity students chart the course Scoop traveled matching the picture in the flow chart with the correct paraphrase. When the students have finished, discuss their answers and have a student read the captions sequentially to reinforce the food production paths.

Additional Activities:

1. Ask students to develop flow charts for a food item other than corn. The entire class could work on a single meal—dinner, for example — and groups of two or three could develop the story behind their favorite foods. The flow charts could then be bound into a booklet and shared with the families of each student.
2. Have students determine where food they have in their homes was processed by checking package labels. This would give them a better understanding of the long distances food travels before it reaches them.

Activity 4:

FOOD AND THE LAND

Objectives:

Students (1) explore the relationships of food and the land and (2) are challenged to clarify their personal values toward current and future land use.

Background Information:

As long as a steady supply of affordable food continues, conservation of the land may not seem to be important. However, many facts indicate that we must not lose much more soil or much more agricultural land. If we do, food shortages and higher food prices may result.

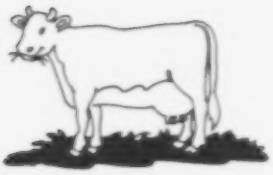
One very important method of maintaining productivity is to adopt a stewardship philosophy toward the land. Stewardship implies wise use of the land today so we can have an abundant food supply in the future.

Soil and water conservation practices are an integral part of stewardship. A major goal of conservation practices is to reduce the speed of runoff water. This increases the amount of water available for plants and allows more water to percolate through the soil, increasing groundwater supplies. In addition, it reduces soil erosion.

There are a variety of soil and water conservation practices that students can see in cities and in the country. Here are a few examples:

Urban Practices

Mulch, such as straw, burlap, or synthetic material mixed with grass seed, is placed on slopes at construction sites to reduce erosion until grass can grow. Ditches are lined with grass, rock, or concrete. Streets are constructed around instead of up and down hills.



Rural Practices

Farmers use a variety of planting methods, including crop rotation and conservation tillage. (Conservation tillage involves planting seeds through the plant debris remaining from the previous year's crops.) Grasses are planted in ditches and waterways to slow runoff water and reduce erosion. Crops are planted along the contour instead of up and down hills. Farmers also construct terraces — soil embankments across steep slopes — to halt the uncontrolled flow of water. Crops or grasses are planted on the terraces.

Methods:

After a discussion of soil and water conservation methods, give students the activity sheet and ask them to complete the fact or fiction quiz and thought questions. Discuss their answers using the explanations printed on the master to help answer any questions they may have.

You may also have your students identify soil and water conservation practices in their communities. Students could take photographs, draw pictures, or describe the practices and share their findings with the class.

Additional Activities:

1. Invite a soil conservationist or a farmer to speak about food and the land.
2. Have the students design a bulletin board display, using food facts that show the relationship between food and the land.

DEVELOPED BY

THE COMMUNICATIONS AND EDUCATION GROUP

SOIL CONSERVATION SOCIETY OF AMERICA

7515 N. E. Ankeny Rd.
Ankeny, IA 50021-9764